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You Are Probably Entitled to Amortization

Operation Under Priority Indicates Business Was Essential—The Existence of Over-Expansion and Taxation on Excess Profits Are Most Convincing Evidence

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THE tremendous over-expansion in buildings, machinery and equipment in the years 1917 and 1918 among taxpayers who engaged in the production of articles contributive to the prosecution of the war and the attendant high taxes paid are responsible today for the vitally needed relief by amortization prescribed in the law and interpreted by the regulations. The importance and seriousness of the situation have become more and more apparent as a position more consistent with a stable post-war condition is approached.

The question arising almost at the outset in the minds of the taxpayers is, "Who is entitled to Amortization?" In other words, without giving consideration to the existence of over-expanded facilities and excess profits taxes, the taxpayer hesitates and often entertains a doubt as to whether amortization can apply in his case, solely because his operations, intensive though they were, did not occur in connection with direct government contracts. Often the taxpayer construes the application of amortization as applying to merely specific items purchased or installed for some particular government work. This is an erroneous idea entertained by many as is illustrated by the following excerpts from letters which have been received on this subject from two specific sources.

"We have understood that we have no chance for claim; while we did not do any direct war work, our lathes were used on that work. The building we are in was purchased in October, 1917, and some of our machinery was purchased within the period covered by amortization. We shall be glad if you will advise us."

Again another taxpayer writes as follows:

"We do not think we have a claim for amortization because we continued to manufacture just our regular product throughout the war period. While we purchased a lot of additional equipment, it was only to increase our capacity and there are few if any special machines that cannot now be used, provided we have the volume."

Reference to the Revenue Act of 1918 makes it clear that the differentiation between those industries to which amortization shall or shall not apply is as between essentials and non-essentials. The fact that any industry was allowed to operate under priority is evidence sufficient of its essential character. The existence of over-expansion together with taxation in the excess profits brackets is most convincing evidence that relief by amortization is available.

The excerpts from letters presented and the actual experience in many other instances show that there exists only a hazy conception of what should constitute the amortizable costs. These costs are essentially the increase in permanent assets from April 6, 1917, to Dec. 31, 1918, plus any 1919 charges which were irrevocably committed for in 1918.

Many taxpayers who have problems covered by other phases of the tax law think that these problems are paramount, overlooking entirely the amortization phase, when in reality amortization is the most important and as such stands alone, affecting but not affected by any other tax problems for its determination must be made before consideration to certain other tax problems can be given. This being the case there is not the slightest reason why a claim for amortization should not be filed, wherever it exists. As a matter of fact it is vitally important that the amortization phase of the tax law be given first consideration.

As the relief by amortization constitutes a reduction in the taxes of 1918 and 1919 but 1918 for the most part, as this was the year of greatest earnings and highest taxes, it is necessary first of all that over-expansion in the nature of additions to buildings, machinery and equipment actually exist and stand in the records today as "increase in permanent assets."

Second, it is necessary that the over-expanded industry should have been taxed in the excess profits brackets (30, 65 or 80 per cent) in the year 1918 or (20 and 40 per cent) in 1919, in order that relief by amortization which is in reality special depreciation, shall constitute a relief greater than ordinary depreciation which is the minimum deduction from gross income in computing taxes.

These two requisites existing, the determination of the justifiable amortization allowance remains only to be made in accordance with the regulations and standards of the amortization section in order to secure examination, approval and credit against any taxes due and unpaid, or refund.

The existence of these essential factors is not by any means a criterion. In other words, the absence of the excess profits bracket in the taxation for 1918, with, however, a material increase in permanent assets, does not indicate necessarily that the particular industry is not in reality subject to amortization. It may be that in accounting a policy of liberal expensing of capital charges has been followed which when corrected, as it surely will be by the government auditor, will develop the fact that the particular tax should have been at an excess profits rate. Ignorance during this most intensive war period led taxpayers in many cases to amortize by improper expensing. Amortization is, therefore, the compensation for assessments arising from this source, thus stabilizing the economic and operative situation by removing from the taxpayer the burden of over-expansion which really existed, whether accounted for in a

manner consistent with modern accounting principles originally or subsequently arranged to conform to these principles.

At the signing of the armistice and with the multitude of cancellations attendant upon it, the over-expansion became in some cases alarmingly apparent at once. The general ignorance of the existence of relief by amortization as prescribed in the law or the scanty knowledge of its application, if existence were known, accounted for the inaction of many taxpayers in claiming their relief even though the need grew more urgent day by day. Inadequate claims, also, were filed by those whose imperfect knowledge of the law and regulations operated to the taxpayer's detriment. This procedure, was not confined to taxpayers alone, but was also followed by incompetent tax advisers acting in their interests.

The claims as a whole, particularly in the early days, were set up in a most incomplete manner, one which could not but secure disallowance at the hands of the examiner because of its lack of conformity to the requirements as prescribed in the regulations.

Many taxpayers after a slight decline in the early part of 1919 found their production demand soaring to greater heights than ever, which continued well into 1920. This was true particularly of the automotive industry.

For this additional production the taxpayer was obliged to expand further. The need for amortization in these cases was not, therefore, felt until the latter part of 1920 and early part of 1921 during which time the decline which was destined to come, arrived and progressed in a most precipitous manner.

War was declared on April 6, 1917. The armistice was signed Nov. 11, 1918, and the war ended formally March 3, 1921. With these dates clearly in mind together with the effects resultant of the war, it is obvious that in the cases of particular industries, a further expansion after Nov. 11, 1918, could only be considered of distinctly abnormal nature, even as the demand for production of 1917 and 1918 was intensely abnormal. The 1919 and 1920 production was due entirely to the war time momentum, depleted commercial inventories, and the justifiable hesitancy on the part of all industry to recognize that the whole period was non-representative and that the inevitable decline to a stable position must come even though little could be done to relieve the situation in those particular cases where abnormal post-war expansion was required. Unfamiliar with the probable results and without regard for economic law and precedent because of the urgent need for production in the shortest space of time and with no time for retro- or introspection, the manufacturing industries were obliged to expand materially to meet a recognized greatly increased productive demand. Relief for this situation by amortization, is specifically afforded, thus compensating in a measure for the enforced plant expansion. Had there been sufficient time for the industries to investigate and analyze the subsequent tremendous demand of 1919 and part of 1920 they would have learned by plotting the projection of their accumulative production curve over a representative period of years, that the 1918 production figure could not possibly under normally prevailing conditions be reached for several years to come. A realization of the inevitable results might or might not have reduced the portion of over-expansion for which no relief is provided in the Revenue Act of 1918, depending on the volume and intensity of productive demand and the general outlook. The latter proved of little value as a guide owing to the sharpness of the break when the decline came.

Unfamiliar also with results attendant upon the situation recently experienced because the resultant effect had not yet appeared, and in no position to prevent it, some industries, particularly the automotive, expanded further because of the fact that it was inadvisable seemingly to do otherwise. The projected accumulated production curve showed in the face of all the facts, that 1918 production could not possibly, judging by sound precedent, be expected for some years and indicated beforehand the increased differential between investment and production, all this with a dollar value decreasing rapidly up to 1919 and increasing thereafter at a relatively rapid rate. This in itself definitely establishes amortization to a considerable extent and also the amount of post-war expenditure which could never be reflected in production owing to the difference between the replacement and actual cost; in other words 100 per cent loss to the taxpayer.

This resultant effect of the war upon industry rendered the need for amortization to those who were forced to expand subsequent to the signing of the armistice, more vital than the need for amortization to those whose expansion ceased with the signing of the armistice. In fact, the degree of over-expansion subsequent to the signing of the armistice has been the deciding factor against the corporate life of many industries. The reduction in value of amortization as a relief from over-expansion is evident when it is considered that an industry expanded a given amount in 1917 and 1918 receives a 50 per cent relief and another with like over-expansion in 1917 and 1918 but an enforced additional like amount in 1919 and 1920 receives 50 per cent, to be sure, of the 1917 and 1918 over-expansion, but which applied to the total over-expansion constitutes a relief of but 25 per cent.

Both the uncertainty of the future with respect to demand and the possible change in character of production are proof sufficient of the absolute necessity of reconcentrating to the maximum degree.

This frenzied condition of 1919 and 1920, no less frenzied, however, than that of 1917 and 1918, constitutes in itself, then, merely the last half of the whole war period. Statistics in general of this period, therefore, can constitute no criterion by which to judge value in use of a plant in the going business of the taxpayer, for the intensive demand is gone. The need for the over-expansion as expressed in buildings, machinery and equipment is gone and indeed all of the over-expansion has either been disposed of at very low figures, or destroyed, or is subject to disposal when it can be marketed at all, but which probably will be scrapped, or if retained, will have no possibility of economic value.

Adjust Plant Facilities Without Sentiment

These facts are presented to convey to the taxpayer's mind the absolute necessity of co-operating with himself to re-adjust his plant facilities without sentiment to the reasonable limit. The taxpayer, who has been obliged to over-expand, is sure of the amortization allowance. The future he knows nothing about except that which can be gleaned from past operative facts and these facts surely do not indicate anything which could and would not be accomplished by reconcentration.

In fact the reorganization of facilities so far as is possible, is consistent with the economic law relative to production and investment and must sooner or later be

obeyed or the natural penalty will be paid. The delay in reconcentration due to basing of plans on hopes of the future is absolutely unsound and should be eliminated from all consideration of amortization. Under the regulations amortization is divided into two distinct classes, the first known as Class I, dealing entirely with buildings, machinery and equipment which have been already discarded or will be at a known date previous to March 3, 1924. The second, or Class II, deals with buildings, machinery and equipment which have and will undoubtedly continue to have a certain value in use to the taxpayer in his going business.

Class I amortization applies particularly to those who departed from their production of a standard product, took over essential work or intensified production of standard material and prepared for the same by the erection of buildings and the installation of machinery and equipment, most or all of which has no value in use to the company in its going business and is therefore discarded and amortized under Class I.

Class II amortization covers buildings, machinery and equipment which have a certain value in use to the taxpayer in his going business and probably, within reason, will continue to have.

The residual value, of course, under Class I consists of either salvage or scrap values. The scrap or salvage values during the war period were abnormally high even as all constructive material costs were high. With the end of the war these values are fast approaching the normal so that claims presented today or later under Class I or Class II, because of the position of the useful value, cannot but secure the maximum degree of amortization allowance. The fact that no market exists today for many manufactured articles must be recognized and the advisability of scrapping carefully considered in view of the indeterminate time factor relative to disposal by sale or value in use, with the attendant deterioration, possibility of changed nature of product and the ability to buy machinery more suited for the particular requirements at a greatly reduced cost.

In the taking of amortization under Class I or that of discarded equipment, the procedure is divided into two distinct divisions. The first naturally covers buildings, machinery and equipment which actually have been discarded. The second is created by the understanding of amortization by the taxpayer together with the reasonable attitude of the department and the important part which reconcentration can and must play for his best interests.

In developing a plant during 1917 and 1918 to meet the abnormally intensive demand for war requirements the identity of the pre-war reasonably efficient plant was lost in the effort to turn out a greatly increased production even though this production was not by any means consistent with the investment.

In order to reconcentrate, therefore, it must be first taken into consideration that the pre-war efficient plant, because of the destruction of its identity cannot again be reproduced without entailing a prohibitive expenditure. Reconcentration must be effected regardless of sentiment in order to bring the investment and production relation into a position as economic as possible.

In so doing many buildings and pieces of machinery and equipment are discarded. By discarding is not meant the dismantling and removal for this again would entail a cost which would obviously be unfair to the taxpayer. The attitude of the department has been most equitable along these lines, allowing the taxpayer to discard, notifying the commissioner of the fact and filing with him a suitable affidavit to this effect and agreeing not to again use discarded items before first reporting them to the commissioner, at which time the relief originally allowed by the government would be restored, at least to the extent of percentage of the replacement value.

Restoration of Amortized Facilities

It is obvious that re-adjustment at the present time cannot but operate for the best interests of the taxpayer, for with maximum relief allowed and the reconcentrated plant having increased production because of demand up to 100 per cent, it is apparent that this plant will be operated 100 per cent capacity and at the greatest efficiency before the idea of restoring the amortized facilities would be entertained. The restoration of facilities is nothing more nor less than the provision of additional facilities if the amortized ones did not exist, which surely would be accomplished through the regular channels of amortization and construction in any event. The distinct advantage of the restoration of amortized facilities lies in the fact that they can be operated at once whereas construction of additional buildings and the purchase and installation of machinery and equipment require a considerable length of time.

The consideration of Class II amortization involves many interesting factors which do not present themselves at all upon reading the regulations. Statistics show that in the major portion of manufacturing industries the production for 1921 at least has been less than that of 1916. In many cases the average of 1919, 1920 and 1921 has been less than that of 1916. It has been shown that the war period was essentially 1917, 1918, 1919 and 1920, the distinctly abnormal condition due to the war prevailing in many cases, well into 1920. The unknown factors relative to the years to come, during which production will continue on its course, tend to reduce the actual effective relief by amortization owing to the very uncertainty of things.

It is a fact that the declines after all great wars such as the Napoleonic and Civil wars have been marked and a long period of low prices and high dollar value, relatively speaking, experienced. With the war period of four years' duration, so far as its effect on the United States is concerned, the fact remains that the decline is now being made over a shorter period and at a more rapid rate than in the case of the great wars mentioned.

It is clear beyond question that with the post-war production less than in 1916, the investment representative of increased capacity is not reflected in production which is therefore proof sufficient of maximum amortization. In other words, the increased investment of the war period, amortizable or non-amortizable as distinguished between investment of 1917 and 1918 and the period 1919 and 1920, represents a financial burden which has no economic value, or value in use, beyond the reasonable salvage value with due consideration for the replacement value, of which value the recent rapid return toward the normal has demanded recognition in the consideration of amortization.

In the consideration of amortization from a Class II or "useful value" standpoint many cases come under observation which have to deal with plants which were entirely adequate before the entry of this country into the war but which expanded tremendously to meet the intensive demand. With the cessation of hostilities and the return to peace-time operations, the pre-war plant

is again entirely adequate for all possible demand for production. This fact can be easily proved as can the existence of no greater volume of business now than previous to the war; nor can this volume be increased materially, for the need cannot exist. This applies particularly to shipbuilding and machine tool industries.

The return to the pre-war plant basis has been rendered physically, mechanically and practically impossible owing to the prohibitive cost of so doing. This inability to return to the pre-war arrangement which was entirely adequate and with no possible present demand for expansion, has made it necessary to retain certain items and amortize them under classification No. 2 or "value in use."

It is clear that 100 per cent value in use cannot be greater than the replacement value and can, therefore, only apply to the portion of the actual cost equal to the replacement value. This factor of replacement value cannot, therefore, be disregarded with the differential between it and the actual so apparent today. It is the return toward normal, which dates really in many cases from the latter part of 1920, the 1921 operative results having been generally less than those of 1916, and the decline in prices which have made it imperative to take the replacement value into consideration.

Replacement and Salvage Values

Operative facts since the war prove generally that in the determination of amortization under both classes the salvage values must be taken. This is distinctly provided for in the regulations which state specifically that in no case can the useful value be taken as less than the salvage value. The present day conditions, however, being nearer a stable post-war condition, have automatically demanded recognition of the replacement value, whether considered by reducing the actual to replacement cost before applying salvage values, or by adjustment of salvage values consistent with the facts to arrive at the same objective.

The application of reduction factor, however, to the actual cost to arrive at the replacement figure is in some cases difficult and open to question. This can be compensated for in the establishment of salvage values which, expressed in terms of replacement values, can be determined with reasonable accuracy. It is apparent that the salvage value expressed as a percentage of the actual cost is essentially a considerably greater percentage of the replacement cost, this increment increasing up to that time when prices shall have stabilized and the effective dollar value become uniform over a representative period of time.

The regulations interpreting the revenue act of 1918 cover various prescriptions which must be observed and phases of the situation which must be considered in the preparation of a report substantiating an amortization deduction.

It is most important to note that amortization is entirely divorced not only from any and all other tax problems but in its computation, "all allowances made to a taxpayer by a contracting department of the government or by any other contractor for amortization or fall in value of property, whether such allowance were made as a part of the price of the product or in settlement of claims arising out of the cancellation or termination of contracts, shall be included in gross income. In the computation of taxes all payments arising out of the settlement of such claims shall be included in the accrued income of the taxable year in which such cancellation or termination (whether formal or informal) occurred. The amount of amortization to be allowed as a deduction from gross income for the purpose of the tax shall be computed in accordance with the provision of Articles 181-189, pursuant to which the deduction must be made, and not upon the basis of any amounts contractually or otherwise determined." The foregoing quotation from Article 181, Regulations 45, makes it very clear that the existence of contracts with allowances for amortization or fall in value of the property does not in any way affect the claim for amortization of war facilities to be allowed as a deduction from gross income in the computation of the tax.

Too much credit cannot be given the corps of engineers of the amortization section in Washington, who in their examinations in the field have solved the various problems relative to interpretation of the regulations, consistent with the date of examination, in a most material and satisfactory way. These interpretations became absolutely necessary owing to the fact that literal interpretations of the regulations, in some respects, could not at the time of examination be strictly adhered to.

It was early recognized that, whereas the Regulations state: "In the case of property not included under Class I the value shall be the estimated value to the taxpayer in terms of its actual use or employment in his going business; such value to be not less than the sale or salvage value of the property," and "In the determination by engineers of the Bureau of Internal Revenue, of the proper amortization allowance, the estimated value to the taxpayer of the property in terms of its actual use or employment in his going business shall be as of the time of such termination," and "In the final determination, the amount of the amortization allowance will be ascertained upon the basis of stable post-war conditions under regulations to be promulgated when these conditions become apparent."

Yet in the case of many claims reviewed and examined in the field in 1919 and the first part of 1920, which was a part of the war period, with the prevailing abnormal and non-representative conditions and productive facts, the amortization allowance could not be determined as of the day of examination because the war and its effect was not then over. A well recognized state of abnormality existed so that in no way could the reasonable deduction for amortization be determined from a comparison of data which were known to be distorted by the war conditions and, therefore, non-representative. Amortization is based on the relation of the value in use to the taxpayer, of the amortizable costs in his going business, not the value in use of the amortizable costs during an abnormal period in his abnormally expanded business. The relation of value in use in his going business to the going business pre-war capacity plus the expanded capacity on a uniformly comparable basis determines the amortization allowance.

It is, therefore, apparent that the year 1921 was in reality the first post-war year. With the useful value below the salvage in the majority of cases today they should be settled on the salvage value basis with due consideration to the replacement value. This basis for some time to come cannot but represent an additional burden which reflects itself seriously in consideration of the keen competition prevailing.

The only real difference between Class I and Class II, which in fact automatically becomes Class I by virtue of the position of the useful value, is that in the case of a

straight Class I property the amortization is arrived at by applying the salvage value percentage to the bare cost of amortizable items and 100 per cent amortization to the contingent costs; whereas in the case of Class II amortization because of the low position of the useful value relative to the salvage value, the salvage value percentage adopted in lieu of value in use is applied to the total cost of any particular item.

It is probably true that whether the recession toward normal came immediately after the signing of the armistice or toward the end of 1920 its coming was inevitable and undoubtedly has carried below the normal.

The abnormally high non-representative productive figures of one and one-half years after the signing of the armistice which prevailed in some lines of industry, particularly the automotive, cannot alone be taken as any criterion.

The real factors which enter into the determination of value in use are the high figures of 1919 and one-half of 1920, the low figures of several more years which can be closely figured by hypothesis and the time factor over which the high and low range of production obtains.

The time fatcor of the low range will predominate in most cases which, according to the extent of predominance, lowers the point of reasonable useful value below the mean between the high and low, to that which will not exceed the salvage value point particularly when due consideration is given to replacement cost.

The regulations provide that the examination up to the present time is a strictly tentative one, which experience has shown is well fitted for the very contingency that has arisen. It has allowed the taxpayer to secure a portion of the amortization due him as a relief from his over-expansion and left the balance as a factor of safety to taxpayer and government alike, the final determination, after sufficient lapse of time to promote reasonable stability, to determine the exact balance due.

As a matter of fact already the tentative allowances made are found to be in many cases no greater than the definitely established difference between cost and replacement value which leaves a balance equal to the difference between value in use and the replacement value.

Situation at the Beginning of 1922

The status of amortization among the taxpayers at the beginning of the year 1922 is well worth a brief review. The lapse of time since the signing of the armistice, together with the known character of the war period operations up to March 1, 1921, has automatically determined to a great degree the standpoint from which any report substantiating amortization must be viewed.

The lack of positive representative data up to 1921 obviously and irrefutably has operated against the taxpayer whose claim was filed in 1919 and some in 1920.

With the sluggish return from a productive point below normal to the normal it is clear that generally speaking a normal salvage value basis must be used in determining the amortization deduction. The salvage values which naturally followed the frenzied trend of 1917, 1918, 1919 and part of 1920 have reached a subnormal point, but a point which, if applied to the replacement value, will represent a more equitable salvage value with respect to normal.

The recognition of these facts indicates clearly that claims figured in 1919 particularly and many in 1920 have not been equitably settled because of the lack of positive stable data on a basis fair to the taxpayer. There may be remote cases where the reverse is true. If so the reopening of the case will reveal the excess allowance. In the great majority, however, the facts will prove a balance due the taxpayer.

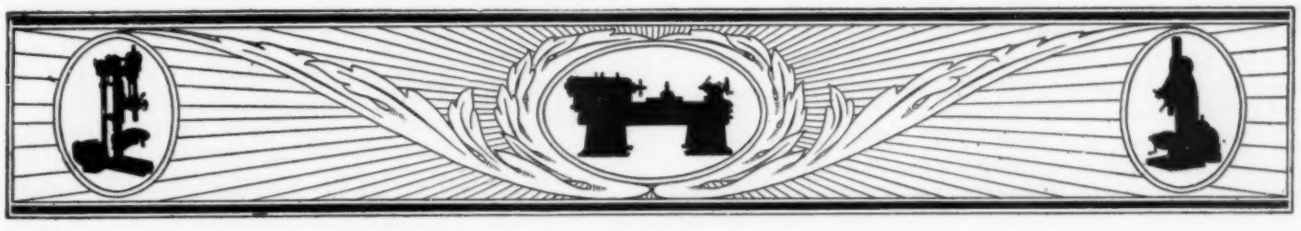
Reopened cases of course constitute redeterminations and are subject to delay sufficient to allow original determinations to be made by the department.

The above illustrates the meaning of the part of Section 214 of the Revenue Act of 1918 which states that the commissioner may and at the request of the taxpayer shall re-examine the return.

The ultra-conservative attitude of the department in handling claims, up to the present, unquestionably due to the lack of positive data, operates naturally against the necessity for reopening on the part of the government. The same factor, however, clearly establishes the advisability of reopening on the part of the taxpayer whenever the productive facts over representative post-war period warrant and they absolutely warrant today and will for some time to come, according to all indications.

There are many taxpayers who have filed an original claim examination of which, however, has not been reached by the examiners. These original claims either wholly or partly unsubstantiated, are not in a form acceptable to the department. It is most advisable then that all taxpayers who have filed claims and have not been examined, should attend to the substantiation at once so that entire or substantial disallowance may be avoided and a re-examination made necessary at a considerable later date. The disturbing feature of a situation like this is that any assessments made must be paid and the amortization ultimately allowed recovered subsequently as a refund. On the other hand with the claim properly substantiated at the time of the engineer's visit, the claim can be approved and credit used against any possible assessment accruing from the complete tax examination at that time. The vital importance of this feature is most obvious.

The foregoing consideration of amortization, based largely upon experience, answers in a reasonable and brief manner the many questions which naturally arise in the mind of the taxpayer. The practical nature of the consideration places it in a more pertinent position, so far as the taxpayer is concerned, than any theoretical or hypothetical discussion or deduction.



The Expanding Markets for Machinery

Volume of Exports to Europe—Value of Machinery Exports to Latin America—Importance of Japan as a Market—Opportunities in Other Countries

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IN PREVIOUS articles, attention has been called to the changes that have developed recently in the foreign demand for American machinery. The flow toward Europe represents a smaller percentage than formerly while the demand in certain other countries is rising rapidly. The chart, Fig. 1, was published in

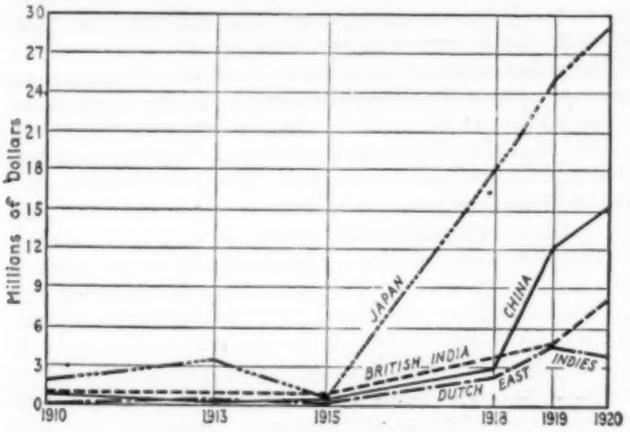


FIG. 1. VALUE OF EXPORTS OF MACHINERY FROM THE UNITED STATES TO JAPAN, CHINA, BRITISH INDIA AND THE DUTCH EAST INDIES, 1910-1920

Commerce Reports for Jan. 16, together with some other data to illustrate these changes. At the same time it was pointed out that although Asia had absorbed only 7.4 per cent of the American machinery exports of 1910 and 6.8 per cent in 1913 the indications suggest that for 1921 this participation will prove to have been 25 per cent.

There is always a danger that a statement of this kind emphasizes too strongly the expansion of certain markets and a chart, Fig. 2, has been prepared showing the experience in Latin American countries corresponding to that previously published for Asiatic countries.

It is regretted that it is not yet possible to present figures showing the experience for 1921, but the necessary data are not available. But it is felt that in the two diagrams the record presented gives the experience of those markets that show the best prospects of absorbing increasing quantities of American machinery and deserve corresponding attention. Obviously conditions in each of these sections are vastly better than in prewar days, and the value of these markets has advanced far beyond the levels that were then considered normal.

The charts show that Cuba was one of our very best markets for machinery through 1920. It is recognized that the business community there has suffered seriously since then and it will require more time for matters to adjust themselves, but the value of the market remains and trade will revive as soon as the complications of the sugar market dissolve and a reasonable period of reconstruction elapses.

Japan probably ranks next in importance and during recent years has been one of the most consistent machinery buyers we have. It is true that a great deal of this equipment was employed on its naval program, which it is understood is now abandoned. It is, therefore, anticipated that there will be a reduction in the amount of dockyard equipment absorbed in that market during the next decade. On the other hand, industrial Japan is showing very rapid development.

Mexico is apparently next in order of importance. There is reason to believe that this market has been absorbing important quantities of American machinery, and if relieved from further political disturbances will need additional equipment of great variety and in large quantities. The greatest care should be exercised in the matter of terms of payment.

China has been absorbing large quantities of American equipment in considerable variety and it would appear that the quantities and varieties may be expected to increase. The United States has heretofore secured only about 30 per cent of this business. It is hoped that the time has now arrived when the Chinese will buy increasing quantities of equipment and also will buy an increasing share from American suppliers.

Brazil and Argentina have been and are important markets. Recently there has been a disturbed situation in both of these countries, but reports indicate that Argentina has liquidated more than 80 per cent of the stocks once held in the custom house and Brazil is also making good progress.

Similarly British India and the Dutch East Indies

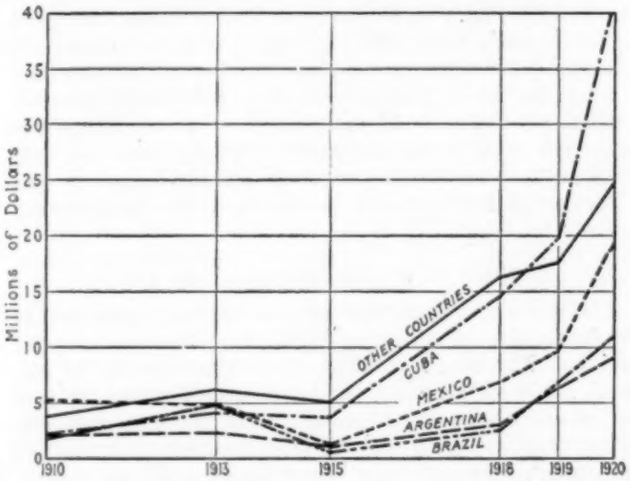
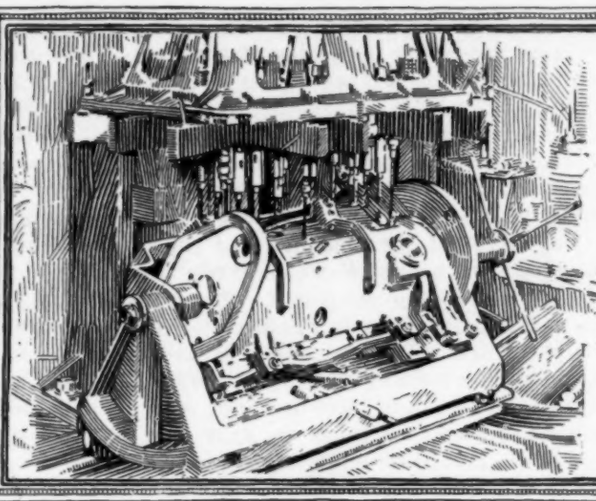


FIG. 2. VALUE OF EXPORTS OF MACHINERY FROM THE UNITED STATES TO LATIN AMERICA, 1910-1920

have felt the shock of the collapse in the world's markets, but are now on the road to recovery.

It would appear that there is reason for a good deal of optimism regarding the eight machinery markets mentioned above and several of the other lesser important markets from the American point of view, as for instance Australia and South Africa. Even though Europe has in the past been our best customer and is now demoralized, it is not wise to allow the disappointment there to hide the other opportunities which are real and are expanding.



Tool Engineering

By
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Facing Tools for Turret Lathes Continued—Arrangement of Blades in Cutter Heads—Roughing and Finishing Heads—Combination and Universal Tools

VARIOUS methods of holding cutter blades in position can be used in facing heads, some of these methods being similar to those which have been described in connection with boring bars. The manner in which the blades are arranged in the cutter head naturally determines to some extent the method of fastening to be used, but there are several points of importance which should be carefully thought of when determining on the method of fastening.

(1) The thrust of the cut should come against the solid portion of the cutter head in the majority of cases. It is advisable, however, to consider the operator and his convenience when determining the position of the various screws, pins or other means of holding. This point is not of so great importance in a cutter head which is simply used for facing one surface; but when adjustments must be made for several diameters and a number of depths, it may cause a great deal of trouble.

(2) Cutter blades which are used for facing, as well as those employed for turning and boring, should be well supported as near to the cutting point as possible, in order that there will be no vibration during the cutting action. In other words, blades should not overhang on the cutter head any further than is absolutely necessary. It is often possible to carry out a portion of the head to form a support directly under the cutting point.

(3) The overhang from the turret is important, particularly when the tool cannot be piloted. If a pilot can be used in a bushing fitted in either the chuck or the face plate, a considerable overhang from the turret can be permitted; otherwise a great deal of trouble may be caused by chatter in the unsupported tool body. There are cases when a wide facing cut must be taken, and yet there is no opportunity for support by the use of a pilot. A bracket can be provided on the cross slide or on the ways of the machine to give support when a case like this is found. An arrangement of this kind was illustrated in connection with the design of turning tools for bar work. If it is not possible to support the tool by either of the two methods mentioned, the tool body can be designed so that it will have a certain amount of spring to it, excessive vibration being absorbed by this spring. The tool can be shaped as a "goose-neck" with the hinge point above the center of the work. It will then spring away and not dig into the work.

The points mentioned here should be considered by the designer when laying out cutter heads, and provision should be made to counteract any of the tendencies mentioned. It is not possible to give fixed rules for the design of tools like these, yet the designer should always keep in mind the results produced by the cutting action of the tool. The pressure applied must be counteracted or equalized in some way or other.

In Fig. 315 is shown a cutter blade *A* used in a head *B* and fastened in place by means of a taper pin *C*. The body of the tool is slotted at *D* in such a way that the taper pin expands the slot slightly and contracts the portion surrounding the cutter, so that it holds the latter securely. Another method of holding cutter blades is shown at *E*. Here the blade is held in place against the body of the tool by a straight pin *F*, which is set into the end of the holder at a slight angle and tapered on one side, so that it acts as a wedge against the cutter.

In the example shown at *G* the body of the tool is slotted at *H* and is expanded by means of the tapered pin *K*. At *L* is shown another cutter blade which is held in place by a straight pin *M* set at a slight angle to the edge of the cutter and flatted off on one side, so that it forms a wedge and holds the blade in place. All of these forms are used for holding cutter blades, and the method selected should be one which is most suitable for the work in hand. Care must be taken in using taper pins to provide a means of removing them when it is necessary to take the cutters out. This can be done by cutting a slot or drilling a hole in such a position that the pin is readily accessible.

The example at *N* shows a counterbore which is to some extent a facing tool, although it bores a hole and faces the bottom of it at the same time. In designing a counterbore, the material which is to be cut must be kept in mind, as it has an influence on the design. For cast-iron and brass work the flutes *O* are often made straight, but for steel they are cut on a right-hand helix of about 15 deg. Counterbores for small diameters are often made with three flutes instead of four. When this design is followed, the size should be stamped on the body before fluting, as it is difficult to measure the diameter afterwards. Flutes should be cut deep enough, so that they come a trifle under the diameter of the pilot, in order to produce a clean hole. When the pilot is made as a part of the counterbore (which is not

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usually done), a groove is provided at *P* to give the necessary clearance for the cutting teeth.

The action of a counterbore is not conducive to first-class work, except for the facing of the bottom of the

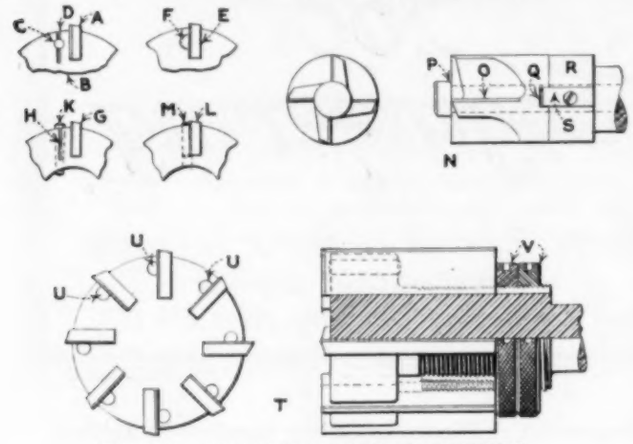

FIG. 315. ARRANGEMENTS OF CUTTERS

hole. The inside of the hole, when the work is of steel, is not usually very smooth; the cutting point is so sharp that, unless a very fine feed is used, the results obtained are not particularly good. However, as the hole produced by a counterbore is usually filled up by the body of a screw or a stud, its appearance is not of great importance. Different sizes of pilots may be used, and various methods of fastening the pilot in place. Revolving pilots are often employed in work where there is a possibility of marring a previously finished surface. In the shell type of counterbore shown, a slot is provided at *Q* for driving purposes. The collar *R* on the bar is fitted with two keys at *S*. Counterbores are often back tapered slightly for clearance.

An example of a multiple cutter head with adjustable flat blades is shown at *T*. The blades are held in place by means of straight pins with tapered sides as shown at *U*, and are adjusted in their slots by the two nuts at *V*, which are moved by means of a spanner wrench. These nuts are of assistance in setting the blades out to depth, and they also serve as a buttress for the rear ends of the blades, thus giving a substantial support. This type of facing head can be used as a counterbore for shallow holes, by setting the blades forward a sufficient amount. For deep holes it cannot be used on account of the trouble which would be caused by chips, as there are no flutes in the tool and no chance for the chips to work themselves out of the hole.

Mention has been made of facing heads which can be used for boring, turning, chamfering and facing. In high-production work tools of this kind are often used both for roughing and finishing operations. The type of head used depends to some extent upon whether the cut is for roughing or finishing. Fig. 316 shows a roughing head at *A*. The work to be done consists of boring the inside of the flange, turning the hub and facing the web. The two tools at *B* and *C* bore the inside of the flange and turn the hub, respectively. These tools are rectangular in shape and are set at a slight angle, in order to make diameter adjustments easily. The tools at *D* and *E* are used for facing the inside of the web. These tools are wide enough so that one cut laps over the other slightly.

The various tools are held in place in slots in the body of the tool by means of square-head setscrews, as indicated. Adjustments are made by means of the screws at *F* and *G*. The body of the tool *H* is fastened to the turret of the machine, and the forward end is provided with a pilot *K* which enters a bushing in the chuck, thus giving support to the entire tool. This pilot is important, as it steadies the cut and prevents trouble which might be caused by vibration due to a considerable overhang from the turret. The tools used in this cutter head are made of rectangular stock, squared up on two sides so that they fit the slots properly. It will be noticed that the thrust of the cut is taken by the body of the tool in some cases, while in others it comes against the setscrews. The reason for this arrangement is the convenience of the operator, the screws being placed so that they are easily accessible.

Another example of a cutter head is shown at *L*. This tool was designed as a finishing and sizing head. The cutter *M* finish faces the wide flange and the tool *N* sizes the shoulder at this point. The tool *O* cuts the recess, while *P* is used to face the end of the hub. All of these tools are made from hardened and ground stock of such size that they accurately fit the slots in the body of the holder. They are held in position by means of strap clamps, as shown at *Q*, *R*, *S* and *T*.

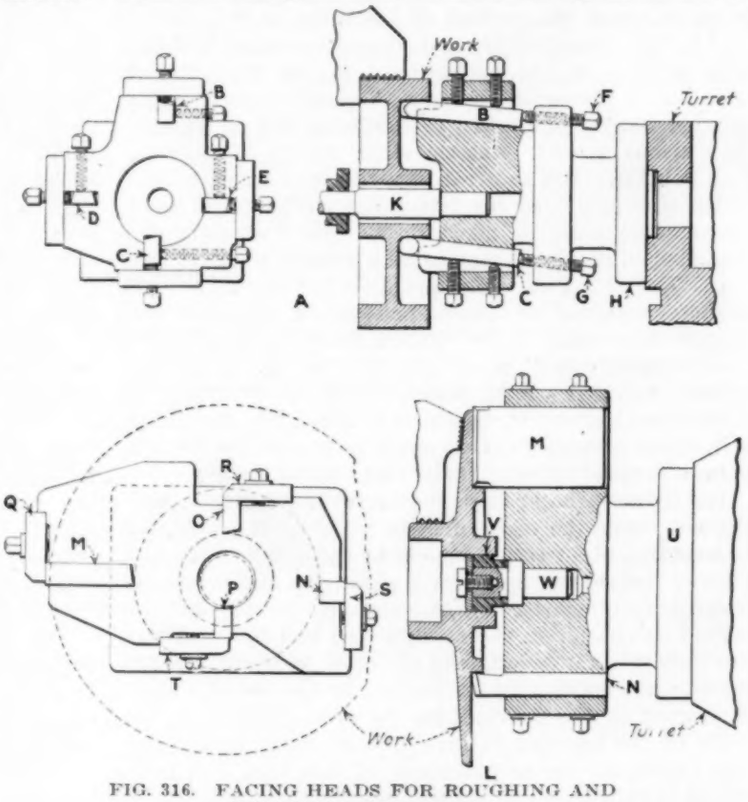

FIG. 316. FACING HEADS FOR ROUGHING AND FINISHING OPERATIONS

Adjustments are made by setting the tools up against a finished piece of correct size before setting up the clamps. The body of the tool *U* is of cast iron, and is bolted to the face of the turret. A revolving pilot is set in the end of the tool, as shown at *V*. The pilot is mounted on a stud *W* in such a way that it rotates freely

when in the work, this being done in order to prevent marring or defacing the surface.

The two tools shown in this illustration are very good examples of the type of facing heads that the designer is

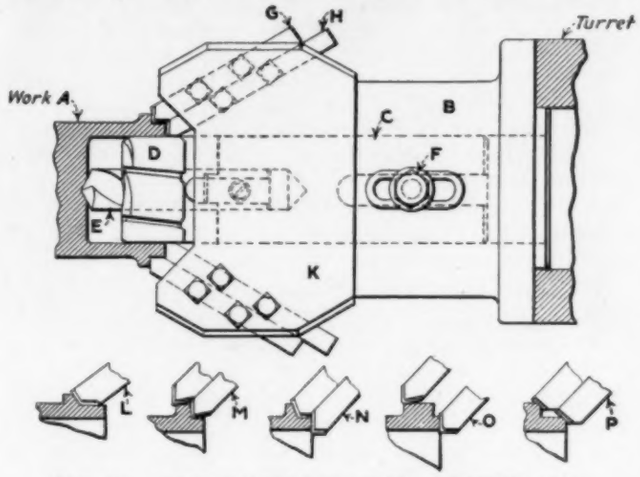

FIG. 317. COMBINATION FACING, TURNING AND BORING HEAD

frequently called upon to make. It is well to note that all facing tools are set well ahead of center, so as to produce a shearing cut, and attention is also called to the manner in which the facing tool *M* is used in connection with the sizing tool *N*. By using this method the size of the shoulder can be preserved accurately, even if the facing tool *M* becomes slightly worn. The method of applying tools of this sort to the turret is dependent entirely upon the shape of the latter, and this factor occasionally changes the design to some extent. A turret of the flat variety naturally requires a tool body of different shape than a hexagon type of turret. The matter of fastening the tool body to the turret is important; and in exceptional cases when very heavy cutter heads are used, it may be found necessary to drill and tap additional holes in the turret, in order to give sufficient stability to the tools.

Combination Heads

For small work having several different shoulders and diameters which are to be machined in relation to a hole or a counterbored portion, cutter heads are frequently designed. A very good example of this type of cutter head is shown in Fig. 317, in which the work *A* is to be machined. The head *B* is of cast iron and is bolted to the turret. Through the center of the body a bar *C* extends, and at the front end of this bar a counterbore *D* is fixed, being driven by means of a key. A spotting drill passes through the center of the counterbore, as shown at *E*. Both the spotting drill and the counterbore can be adjusted independently, and in addition thereto, the bar *C* which holds them can be moved backward or forward and clamped by means of the nuts at *F*. The tools *G* and *H* are hardened and ground so that they fit the slot in the head *K*. They can be adjusted independently, yet they must be ground accurately in order to preserve the shoulder distances.

When a series of operations are to be performed on a piece of work like that shown, several cutter heads of this kind can be used with various arrangements of tools for the different operations, as shown at *L*, *M*, *N*, *O* and *P*. The same casting can be used in all these cases, and settings of the various tools can be accurately made by means of gages. For screw-machine work of moderate size, tools of this sort are very useful and extremely accurate work is produced by them. The operations on the work can be arranged progessively, so that each tool does approximately the same amount of work. When used in connection with a counterbore and spotting drill like that shown, a part of the hole can be bored in one operation, another part in a second operation, and the final work in the last operation. The amount of time saved by this method is readily appreciated, especially when short diameters are to be turned and faced at the same time, as in the case illustrated.

It is possible to design a multiple facing head which can be used for turning, facing and boring, and which will at the same time be so flexible in its design that it can be adapted to a number of different kinds of work within its capacity. An example of a tool designed for this purpose is shown in Fig. 318. The body of the tool *A* is of substantial section, and is arranged so that it can be fastened to the turret. This body extends outward and carries a bar *B* which acts as a pilot in a bushing, either in a faceplate or chuck. As it is easily removable, it can be replaced by a boring bar carrying several cutters, if desired. The upper part of the tool body has four holes *C*, *D*, *E* and *F* at different distances from the center of the holder. A toolholder like that shown at *G* can be furnished with a turning or boring tool for different diameters. In fact, several tools of this nature can be applied to the different holes and suitable adjustments made to cover a considerable range of work.

An extension member or bracket at *H* is tongued to receive a block *K*, which can be adjusted and furnished with a cutter, as shown at *L*. On the opposite side of

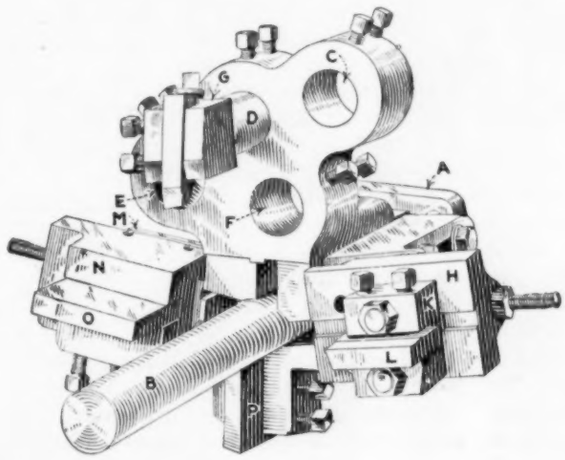

FIG. 318. UNIVERSAL FACING AND TURNING HEAD

the holder another bracket *M* is shown. It also has a holder *N* in which a facing tool *O* can be placed. The body of the holder is slotted to admit a flat-blade cutter at *P*, and suitable setscrews are provided for holding it. The adaptability of a cutter head of this sort can be readily seen, as it can be made to handle a great variety of work by suitable changes in the tool blocks, turning tools and facing tools. Opportunities are frequent in general manufacturing for the use of tools of this sort, and the designer should consider making provisions for adjustment, so that the expense of a cutter head will not necessarily be borne by the particular job for which it is intended. If it is flexible enough, the head can be used for a number of different cases.

Manufacture and Use of Diamond Cutting Tools

III. Diamonds for Drawing Dies—Diamond Dust the Only Cutting Medium—Methods of Reducing Diamonds to Dust

By ELLSWORTH SHELDON
New England Editor, American Machinist

CRYSTALS of diamonds have long been used from which to make the small dies with minute apertures that are used for drawing wire. Gold, silver and platinum for making watch chains, mesh bags and similar pieces of jewelry; the countless miles of fine copper wire used in sensitive electrical instruments, the delicate filaments of the incandescent lamp and many other materials used for hundreds of different purposes are drawn smooth and uniformly to size by means of diamond dies. These dies are made in sizes ranging from 0.0007 in. for tungsten filaments, up to 0.125 in. for drawing copper wire which must be very smooth and held to very close limits in the matter of diameter. Though the cost of a diamond die is relatively high, it retains its size and shape for so much longer periods and imparts to the wire a finish so much superior to that obtainable from steel dies that first cost need not be considered.

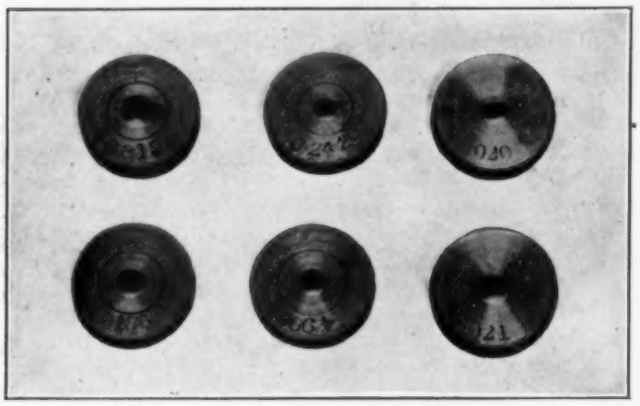

FIG. 14. WIRE DRAWING DIES MOUNTED

FIG. 15. A DIAMOND DRAWING DIE UNMOUNTED

To obtain proper support, diamond dies are mounted in metallic holders or settings, a group of which is shown in Fig. 14. Some users prefer to purchase their diamonds unmounted, as in Fig. 15, and mount them themselves, in order to use their judgment upon the shape and quality of the stone as well as to facilitate inspection of the hole.

Drilling the Dies

There are various methods of drilling and polishing a hole in a diamond drawing die. The essential steps are to take a flat stone of proper thickness, rough off the front and back sides so as to have two surfaces approximately parallel, countersink both sides and then drill and polish the hole to a very smooth finish and to accurate diameter. It is a slow process to drill so small a hole in material so hard, and to pierce a diamond often requires days, even with ideal proportions as to length and diameter of hole.

The countersinking operation is shown in Fig. 16. The stones are mounted either in chucks or upon faceplates by means of diamond cutter's wax. The chucks and faceplates are held to the spindle of the lathe by a floating connection that allows the diamond to be accurately centered without disturbing the wax setting. Several of the chucks with stones mounted in them are shown at the base of the toolrest.

The operation of countersinking is performed by hand in much the same manner that a similar cavity would be turned in a piece of steel upon a bench lathe. Several of the stones are carried along together, and, as the chucks may also be screwed upon the end of the wooden handle that is used to hold the tool, any stone may be used indiscriminately as a tool or as a piece to be worked upon. As there is practically as much material removed from the tool as from the work, an expert operator can thus dress a number of stones into shape very rapidly.

Besides the countersinking, there is more or less turning to be done upon the stones to get them to the proper shape, whether they are to be made into drawing dies or used for other purposes, and as the holding chuck can readily be floated from side to side, the operator is enabled to cut away any portion of the stone as desired.

Drills Are of Steel Wire

Because of the brittle nature of the diamond it is obviously impossible to use diamond splinters for drilling the small holes in drawing dies, and for this purpose needles of steel wire are used. The operation is not really drilling, but lapping; the end and sides of the wire becoming charged with the diamond dust and gradually wearing through the stone.

There are several types of machines used for drilling dies and all are more or less automatic. Some are vertical and others horizontal, and advantages are claimed for each; the principle involved is the same in all cases. A small chuck on the end of the spindle grips the stone, or it may be set with wax on a faceplate. It is the die which rotates and not the needle. The latter is so slender in the smaller sizes that to prevent it from bending, it is necessary to provide means of adjusting the drill-

FIG. 16. TURNING AND COUNTERSINKING THE DIAMONDS

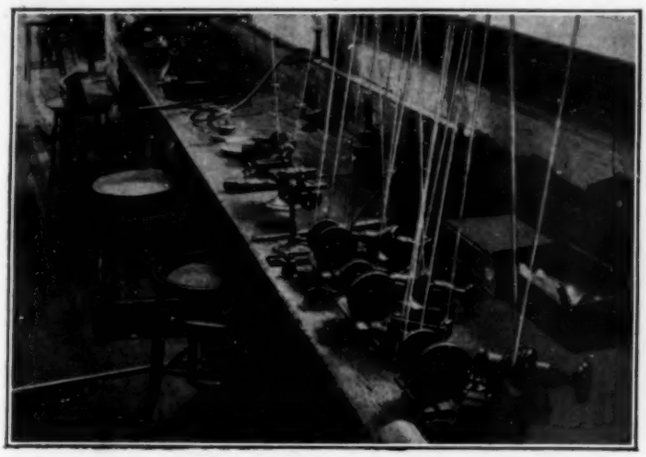

FIG. 17. MACHINES FOR POINTING PHONOGRAGH NEEDLES

FIG. 19. SALVAGING SMALL PARTICLES OF DIAMOND

ing pressure to a fraction of an ounce. The vertical machine may use weights and a balance for this purpose, while on the horizontal machines the object is accomplished by means of springs. The needle is lifted out of contact periodically by a cam, to give fresh con-

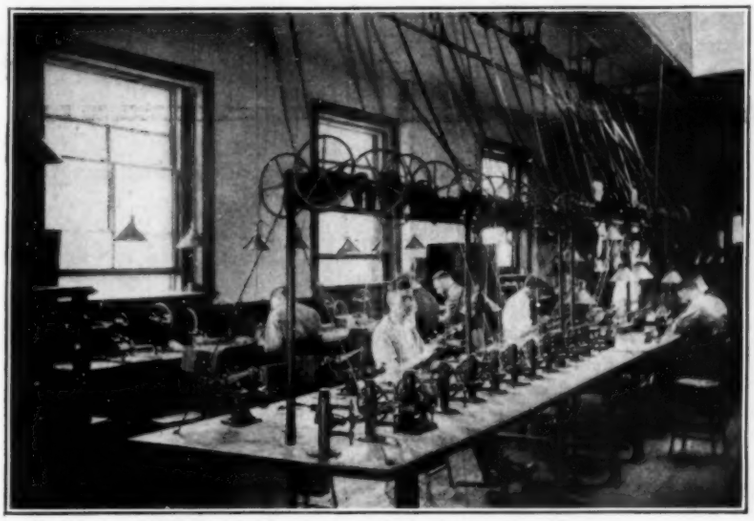

FIG. 18. PARTIAL VIEW IN WORKROOM

tact and allow the mixture of diamond dust and oil to flow under the point.

One prime requisite in a drawing die is that the hole must be very smooth. The surface of the diamond will probably take a smoother finish than any other material, and this fact, together with its undoubted wearing qualities, is the reason for its being selected for bearings in instruments where friction must be as nearly zero as possible—as for instance in certain types of electrical instruments. To polish the dies the needle carrying bar is given both a reciprocating and a rocking or swinging movement that rounds the corners of the holes and blends them smoothly into clearance spaces that were cut in the stone before the drilling was started. In this way a double conical hole is produced that has no sharp corners; a necessary condition in wire drawing dies.

Though all of this work must be under the supervision of an experienced diamond cutter, the actual operation generally devolves upon boys or girls, each of whom will operate twenty or thirty machines. About all the separators have to do is to feed diamond dust to the needles and to see that nothing untoward happens up to the time of final inspection and gaging for size.

The metal settings in which drawing dies are mounted may be of soft steel, german silver, or brass. In general the method followed is to cut a disk from an inch bar of the material, counterbore a hole halfway through it and fit a smaller disk to the counterbored hole. A small hole is then drilled through the center of both disks, the small disk taken out and, with the metal heated to plasticity, the diamond is dropped into the cavity and the small disk pressed gently but firmly upon it.

Any degree of heat short of that to be obtained in a laboratory furnace will not injure the diamond, but because of its brittle nature the pressure must be applied very gently and with thorough understanding; else the diamond will be shattered. Hence the operation is only for the experienced diamond worker.

After mounting, the die is put in the lathe and trued up by the hole in the diamond. The metal part is then faced and turned true and the center cut out with hand tools until the opening blends into the countersunk portion of the diamond.

The manifold uses in industry for a hard, sharp pointed tool has led many to turn to the diamond for this purpose as a most efficient material. Some are long sharp points, either round or having three or more flat sides; others have a blunt polished point for burnishing

FIG. 20. THE BORTZ CRUSHER'S BENCH

gold and silver; and still others are ball-shaped, for use on phonograph records. They are all made by a process of polishing or lapping in which a special machine is used; and in some cases both work and lap must rotate constantly. A row of the special machines for lapping diamond points is shown in Fig. 17, and in Fig. 18 is a general view of this part of the workroom.

Making the Diamond Dust

Diamond dust—about the only cutting "tool" that can be used for working diamonds—is produced from fragments of bortz too small to be used for any other purpose. Were it not for the value of the dust, there might be a stage at which the fragments would be of no value whatever, but as the dust ranges in value from five to twenty dollars per carat according to its fineness and clarity, and as no fragment is too small to be crushed, such a stage is never reached; therefore all sweepings and other refuse from the workrooms must be thoroughly searched. Even the work benches are scraped periodically and the diamond dust embedded in them is reclaimed. From the little pile of "dirt" before him, the diamond worker shown in Fig. 19 expects to retrieve twenty-five or thirty dollars.

The crushing bench where the bortz fragments are converted into dust, is shown in Fig. 20. The implements used are few and simple: A microscope with which to examine the crystals that may be too valuable, as they are to be reduced to dust of lesser value or to look for crystals that may not be diamond at all; a mortar and pestle of hardened steel with which to crush the fragments; several wire screens to grade the product at different stages and receptacles to hold dust and oil.

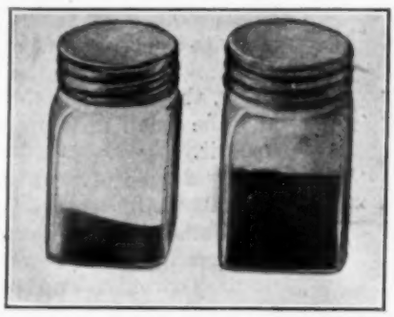

FIG. 21. ONE THOUSAND DOLLARS

No screen is fine enough to be of service in any but the preliminary stages; the final separation is by flotation in oil. Pure olive oil is the medium used, and dust from the mortar is put into the bowl of oil shown in Fig. 20 until a sufficient quantity has accumulated, when the mass is vigorously stirred and a definite quantity poured into the graduated glass where it is allowed to stand for five minutes. The liquid content of the graduate is then carefully decanted into another receptacle and the precipitate gathered up, carefully washed and dried, and put into a container marked "five minute powder." This process is repeated at lengthening intervals until the final precipitate is taken, at which time the oil will be practically clear.

A quantity of fine dust is shown in Fig. 21. Small as this bulk appears it is altogether too valuable to be left around, and these bottles were taken from the office safe to be photographed.

The photographs illustrating the manufacturing sections of this article were taken in the workrooms of the Arthur S. Crafts Co., 125 Summer St., Boston, Mass., and for that privilege as well as for much of the data from which this article is compiled, the author is indebted to F. L. Huston and F. F. Gilmore of that company, whose courtesy and co-operation is hereby acknowledged.

Various Methods for Hardening High-Speed Steel

By A. H. d'Arcambal
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In this paper I will state briefly the advantages and disadvantages of different hardening methods for high-speed steel, proposed in the 20 years which have intervened since Taylor and White made their recommendations.

Salt bath hardening was first introduced in this country in 1902. Ordinarily, barium chloride is the salt used and the operating temperature is from 2,000 to 2,100 deg. F. (1,093 to 1,149 deg. C.) Graphite crucibles are used for holding the salt, the life of these crucibles being from six to eight heats. The tools to be hardened are immersed in the hot liquid and the tools permitted to remain until the entire mass of the tool has attained the temperature of the bath. These tools are then usually oil-quenched, and drawn to from 400 to 600 deg. F. (204 to 316 deg. C.) in oil, depending upon the kind of tool.

No scaling takes place by this method, thus producing a cleaner tool than in muffle furnace hardening, but the method has the following disadvantages: (1) The quenching temperature is too low. (2) Soft scale is sometimes produced. (3) Blistering and pitting sometimes occurs. (4) Pots are very short lived.

It is a well-known fact that to obtain the highest degree of red-hardness, partial austenization must take place. This means quenching from a temperature of 2,200 deg. F. (1,204 deg. C.) and upward; indeed, the higher the quenching temperature above 2,200 deg. F. (1,204 deg. C.) up to about 2,350 deg. F. (1,288 deg. C.) the greater the effect called "secondary hardening"—the added hardness gained by tempering quenched steel. We have heated small test-pieces of high-speed steel 1½ hours in a barium chloride bath at 2,100 deg. F. (1,149 deg. C.), but the microstructure was the same as when left in the bath just long enough for the heat to soak through.

Blistering and pitting of tools heated in a barium chloride bath are said to be due to particles of the graphite crucible which have broken loose coming in contact with the tools and sticking to them. Sometimes these blisters or beads drop off, leaving pits. The longer service the bath has seen the more loss is suffered through this blistering and pitting.

A graphite pot lasts only from six to eight heats, making this method of hardening quite a costly one. A new salt is now being introduced for the hardening of high-speed steel, which can be maintained at a temperature of 2,200 deg. F. (1,204 deg. C.), thus being superior to the barium chloride bath. The container used is a graphite crucible with a cast-steel liner. In this way the steel pot is protected from the flame, and there is no danger of blistering or pitting from particles floating through the bath.

Pack Hardening

Pack hardening consists of packing the high-speed tools with charcoal in a suitable container. The container is then luted carefully with clay, and the whole placed in a furnace, the temperature brought up to around 2,200 deg. F. (1,204 deg. C.) and held there a considerable length of time. Tools are then removed, oil-quenched or air-cooled.

This method gives a tool free of scale, but has the

following decided disadvantages: (1) Quenching temperature is too low, and (2) tools are carburized. We obtained the temperature of some test-pieces with an optical pyrometer just before they were removed from the pack, and found the temperature to be about 2,050 deg. F. (1,121 deg. C.), although the furnace temperature was 2,200 deg. F. (1,204 deg. C.), and they had remained 1½ hours at heat. Scleroscope tests and micrographs verified this temperature. Furthermore test-pieces showed a gain of 0.40 per cent carbon on the surface after being given the pack treatment.

I have been informed by two different men who attempted this method that at times the cutting edges of the tools melted, due either to the higher carbon content of the surface of the tools or to the tools coming in contact with each other. One other experimenter tried to use a cast-iron box for packing, but as cast iron melts at about 2,200 deg. F. the results can well be imagined. Carborundum powder has been suggested as a substitute for charcoal for a packing material, as the former would not carburize the steel. In the writer's opinion, however, high-speed tools treated in this way would be inferior to tools heated in the semi-muffle furnace, because the steel would have to remain at a high temperature for a long time when pack hardened, thus producing a coarse-grained structure.

A lead bath was tried quite extensively about 10 years ago for heating high-speed tools, but the method did not prove a success. At 2,200 deg. F. the vapor pressure of lead is about 20 mm. of mercury, so that severe volatization will inevitably ensue. It is also quite a problem to find pots to hold the same. Difficulty is also experienced in controlling the time of immersion, as lead is a very rapid heating medium. A metallurgist for one of the large tool steel mills in England told me recently that a large amount of high-speed steel was hardened in his country by the lead bath treatment. He stated that they were able to obtain a very pure grade of lead and could operate at a temperature of 2,300 deg. F. (1,260 deg. C.).[1] His method for hardening a 1-in. high-speed hand reamer would be to preheat to 1,500 deg. F. (816 deg. C.) in a muffle furnace, then transfer the tool to the lead bath whose temperature was 2,350 deg. F. (1,288 deg. C.), hold there 15 seconds and cool in an air blast.

Most of the high-speed steel hardened in this country is heated in semi-muffle furnaces, oil or gas fired. It is always advisable to have these furnaces equipped with pyrometers, using noble metal couples. The optical pyrometer is also satisfactory for controlling these high-temperature furnaces.

Work to be hardened should be preheated to 1,500 to 1,600 deg. F. (816 to 871 deg. C.), and when thoroughly heated through at this temperature, transferred to the high-temperature furnace, whose temperature is higher than the desired hardening heat. The tool is left in this furnace until the cutting edges have attained the proper temperature—about 2,300 deg. F. (1,260 deg. C.)—and the material then quenched. Soaking at the high temperature is to be avoided, as it coarsens the grain and is likely to "burn" the steel. In such practice the time factor is evidently just as important as the temperature. Quenched tools are then drawn to the desired temperature. One great advantage of this method of hardening is the high temperature attainable, thus producing the greatest degree of red-hardness and almost complete solution of the carbides. The disadvantage is that the tool scales to a degree, which can be reduced to a minimum by a thorough preheating and the proper mixture of fuel and air in firing the high-temperature furnace. Large high-speed tools have been very successfully hardened by using two preheating furnaces; the first is maintained at a temperature of about 1,100 deg. F. (593 deg. C.) and is used as a stock furnace. The temperature of the second preheater is 1,700 to 1,800 deg. F. (927 to 982 deg. C.). The material will not scale in the first preheating furnace; while the steel will oxidize in the second preheater, it requires less time to bring it to heat, thus reducing scaling to the least possible amount.

[1]At this temperature the vapor pressure of lead is nearly 50 mm. of mercury (see J. Johnston, *J. Ind. Eng. Chem.*, vol. 9, p. 873 (1917).

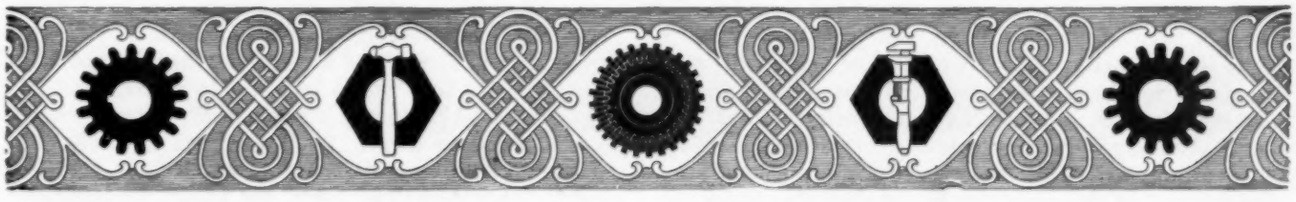
Grinding Wheels Five Feet Wide

The American Emery Wheel Works, Providence, R. I., is making some grinding wheels 10 in. in diameter by 60 in. face. The latter dimension is not a misprint, even though it may seem extraordinary.

The wheels, or drums as they would more properly be called, are built up by regular methods from abrasive and bond, and are fired in the usual manner. They are not, however, made in one piece, as it was found to be impracticable to fire a wheel so wide in proportion to its diameter and get good results.

The drums are therefore made up of several sections, each section a complete wheel except that its sides are not square with the bore. The sides are quite sharply angular, so that when the sections are assembled and drawn together upon the special arbor that thus becomes an indispensable part of the wheel, the joints do not run true around the periphery but gyrate from side to side and thus present the appearance in action of a single continuous surface. This method of joining the sections eliminates the possibility of leaving marks to correspond with the joints upon the surfaces that are ground by the drums.

These solid drums are to take the place of the built-up wooden cylinders that have heretofore been used. The wooden cylinders were covered with leather and "set up" in the usual manner by brushing the leather surface with glue and rolling the drum in the abrasive. The wood wheels required redressing, which involved soaking off the old abrasive and replacing it with new, every few days, whereas the solid drums will run for a year or more without attention. They are used in special machines for surfacing linoleum.



A New Era for Industrial Relations

Capital Now Contributing in Many Definite Ways Toward Industrial Peace—Labor Must Contribute Increased Production—Interdependence Makes Proper Co-operation Vital

By A. H. RODRICK

MUCH has been written and spoken on the proper and ideal relationship between employer and employee, otherwise referred to as capital and labor. Solutions and ideas have been offered, suggested and recommended, by persons in authority and out of authority in all walks and vocations of life for perfecting an ideal state of industrial relationship—sometimes referred to as the golden age. Whether these solutions have been weighed in the balance and by actual tryout found wanting, is a question which can only be determined after exhaustive and extensive investigation, which is beyond the scope of this article. To me the only successful solution is the one that advocates a contribution from each of the classes involved, and the purpose of this article, therefore, is to advance such a solution with the hope that in it may be found such worth as to warrant serious consideration towards applying it in actual practice.

The relationship between employer and employee dates far back in the annals of history, and, though discussed to a greater extent today than heretofore, it is not of itself a new question; only the solution for a troubled industrial relationship is new. The earliest recorded strike was that of the Children of Israel, and was brought about as the result of Pharaoh's order that the Israelites should provide their own straw to make bricks. The outcome of this dispute between employer and employee, which culminated in the exodus of the Israelites from Egypt, is familiar to all readers of history and Holy Writ. From those early days to the present history records innumerable strikes and disputes between the employer and employee in various classes of industry. As the cases recorded are innumerable so the reasons for the trouble are innumerable. As time advanced the employees organized themselves into labor unions, until today society has what is known as the labor movement. Some of these unions or organizations are purely local in character, existing in and dealing only with, the industry of which they are a part, while others cast their lot with a larger body and amalgamate themselves with other trades and vocations.

In this country that larger body is the American Federation of Labor, and to all intents and purposes directs the destiny of the employees in practically all trades. Because of its representative membership the propaganda which this federation publishes and the principles it advocates not only speak the aims and views of the employees but have an effect upon public opinion and reasoning. The American Federation of Labor is organized for the purpose of "self." The preamble to its constitution cites that: "Whereas, a struggle is going on in all the nations of the civilized world between the oppressors and the oppressed of all countries, a struggle between the capitalist and the laborer, which grows in intensity from year to year, and will work disastrous results to the toiling millions if they are not combined for mutual protection and benefit." That same constitution gives as its objects the formation of various kinds of unions, local, national and international; encouragement of the sale of union label goods; the securing of legislation in the interest of the working people; and "influence public opinion by peaceful and legal methods, in favor of organized labor." The two chief unwritten objects of this federation are shorter hours and more pay for the employees. It apparently takes no account of co-operation between employer and employee, nor does it advocate increased production on the part of the employees, and the elimination of trade jurisdictional disputes when same hinder increased production.

Capital and Labor Each Helpless Without the Other

But does a successful solution for a troubled industrial relationship call for a contribution from the employees only? Any solution which advances a contribution from one of the classes only will fail. There must be a contribution from each since each is dependent solely upon the other. Certain elements are involved in the making up of capital and labor. The employer must furnish the capital which is the first necessary element in the successful conducting of the business or industry; without this the industry cannot be started. All the labor obtainable will be of no avail if the capital is not present to erect the shop and procure the machinery from which labor produces the finished product. The employee must furnish the ability to produce, and must put into practice the knowledge of his trade. Capital is obtained through the production of labor, and labor is obtained through the offer of capital. It is true that there would be no capital without labor, *a fortiori* there would be no labor without capital. Each of the contending forces, therefore, is depending solely for its existence upon the other; the success of one is the success of the other; the failure of one is the failure of the other; the interest of one is the interest of the other; and the only successful solution is the one which advocates the co-operation and contribution of each to the welfare of the other.

We are living in a progressive age; the day of lord and serf is passed; the idea of master and servant is obsolete; and the progressive employer in keeping with a new order of things has not only changed but has completely reversed his former attitude toward his employees. In practically every line of industry where the principles of scientific management have been installed will be found an employment department where the hiring, firing and welfare of the employees are carried on by a trained, organized force under the directorship of an employment manager, sometimes referred to as employment engineer, welfare officer or director of personnel. Employees are no longer hired promiscuously nor fired indiscriminately. The whims and idiosyncrasies of unscrupulous foremen are catered to no longer. The employment department by job analysis, by transfer from one shop or class of work to another, by the fitting of round pegs into round holes so to speak, maintains an efficient and contented organization, thereby improving the *esprit de corps*. Such a system not only eliminates the awful cost of turnover, which is an actual expenditure of dollars and cents, but shows the employer's

consideration for his employees. The great human element in industry is no longer ignored. The same thought and attention that is given to the purchase of material is also given to labor; the same thought and attention that is given to the preservation of machinery is now given to human beings. In addition to this method of scientific management special departments have been created such as legal, medical and dental aid where the employees can secure legal, medical and dental advice at the expense of the employer. Retirement, sick and pension systems have been inaugurated, welfare and athletic societies formed, and lunch rooms installed. Various forms of insurance for the care of employees injured both in and out the line of duty are in vogue, and in some industries employees have representation at the council table of the management. All of these departures from the old order of things not only prove capital's consideration for labor but represent in dollars and cents labor's share of the profits of the industry of which it is a part. They show that in some industries the employer is making at least a part of the contribution required of him as a class towards that successful solution which I have described as necessary.

Employees Can Contribute Increased Production

The employers have shown what contribution they can make; it remains for the employees to show what contribution they can make. At a recent meeting of the executive council of the American Federation of Labor the secretary of that federation announced in the public press that the council would attempt to secure for labor a share in the profits of corporate bodies. I have already shown where capital's contribution to the welfare and contentment of labor represents one share in the profits. Labor cannot expect to further share in the profits of corporate bodies unless it makes its contribution to the success of those bodies. The man who does not contribute cannot expect to share, and when there are no profits there can obviously be no share. The contribution of labor to capital lies in one object not yet made a part of the written constitution of organized labor, and that object is—increased production. It has been well said that a little more industry wouldn't hurt industry. Unless labor is organized in a manner that will increase production there can be no profits out of which labor could claim a share. The denial of a machinist's right to drive a nail or a joiner to unscrew a nut—so-called jurisdictional disputes—not only retards production but in many cases has been the cause of stopping production altogether. Samuel Gompers, president of the American Federation of Labor, in a recent magazine article entitled "Union Labor and the Enlightened Employer," said: "Trade unionism is a prime factor for the increase of production. Trade unionism is interested vitally in increasing the volume of production." Mr. Gompers' statements cannot be taken seriously in the light of jurisdictional disputes. As long as trade unions jealously guard craft prerogatives a whole hearted effort towards increased production cannot be put forth. The argument of organized labor against increased production is that it creates unemployment. Professor Norris A. Brisco in his book "Economics of Efficiency," shows by a concrete example that this contention is not well founded. He says in part: "History shows that increase in output in any trade always results in more men being employed, and usually in an increase in wages. The cheapening of any article in common use almost immediately results in an increased demand for that article."

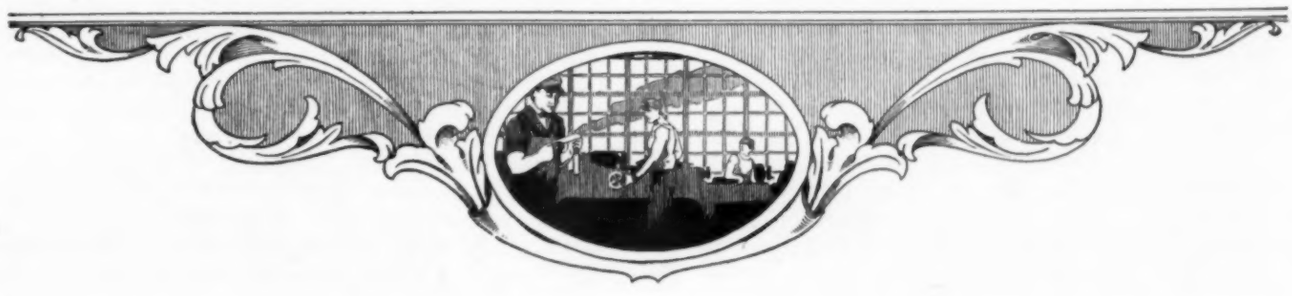
In conclusion the only successful solution for a troubled industrial relationship is one which has for its foundation a contribution from each of the classes involved. Since capital is dependent upon labor and labor is dependent upon capital, these two classes are no longer engaged in a struggle, "which grows in intensity from year to year," but constitute the two major parts of an industrial machine, each depending on the other for its rightful contribution of power to propel the wheels. Capital must give to labor hours and wages commensurate with an American standard of living; it must not look upon labor as a commodity but must at all times take cognizance of the human element. Labor must give to capital an honest return in effort; it must also strive to increase the production of the article upon which engaged. When each has made its contribution then each will be entitled to share the profits whether they be cash or benefits or both. It is believed that if all employers would consider the welfare of their employees as many are now doing, and that if labor would organize for increased production, a new era for industrial relations would dawn.

Tapping With a Bent Tap—Discussion

By E. D. Ward

In looking over the American Machinist on page 857, Vol. 55, I was interested in the description of the use of the bent shank tap. I presume that others may take the matter up with you, but for fear they might not, I thought I would call your attention to the fact that in this article the writer mentioned the necessity for having the shank of the tap smaller than the root diameter of the thread. In another paragraph he suggested the possibility of securing a pulley tap.

Pulley taps are made with the shanks larger than the bottom of the thread. A tapper tap is what he should have referred to, and as a matter of fact, bent shank tapper taps are regularly made and listed by various tap manufacturers.



Operations on the Cylinders of the Wills Sainte Claire

Closed End Cylinders Require Special Tools for Machining Combustion Chambers—Special Boring Machine with Inclined Spindles—Heat-Treatment Removes Strains

By FRED H. COLVIN
Editor, American Machinist

THE motor of the Wills Sainte Claire resembles the Liberty in several ways, both in design and construction. The cylinders are of cast iron instead of steel, and in block instead of separate. There are two blocks each having four closed-end cylinders.

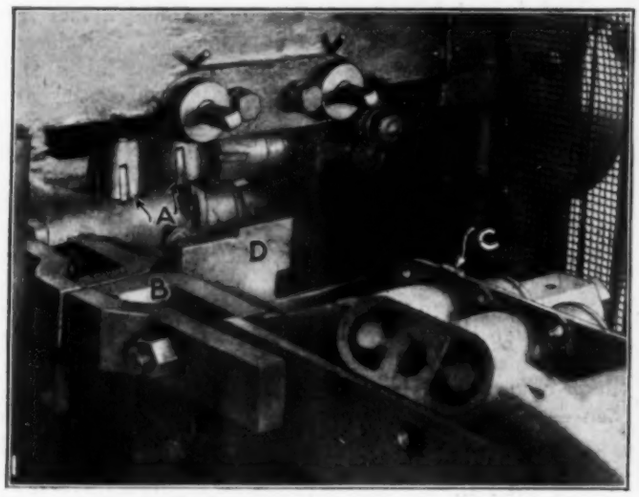


FIG. 1. MILLING LOCATING SPOTS ON FLANGE.

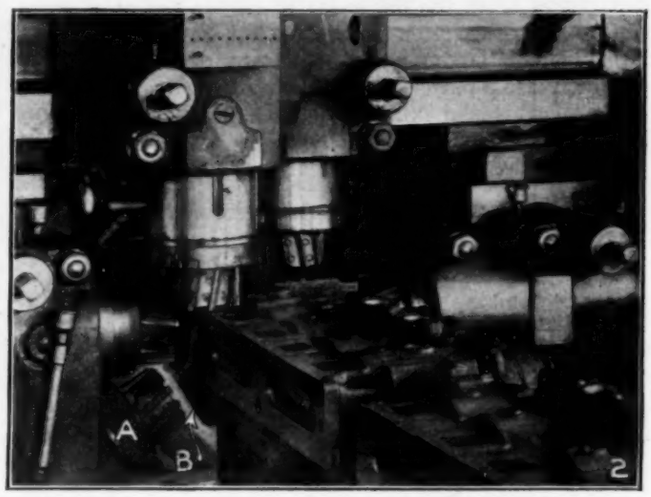


FIG. 2. MILLING ENDS AND SIDES OF CYLINDERS

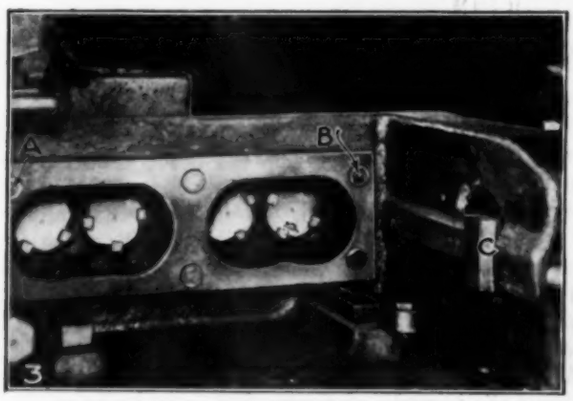


FIG. 3. INCLINED CYLINDER BORING MACHINE.

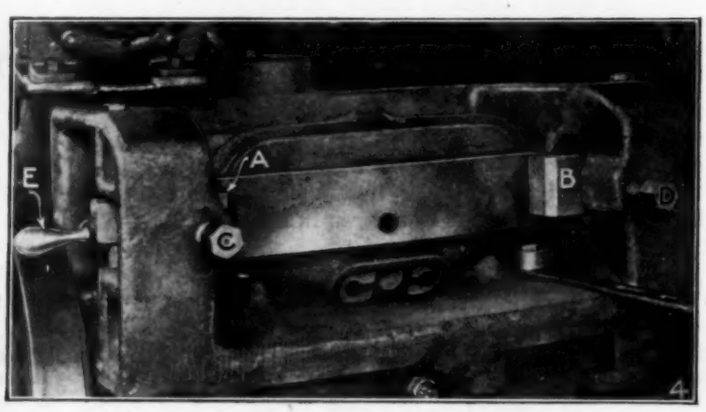


FIG. 4. CYLINDER BLOCK IN PLACE

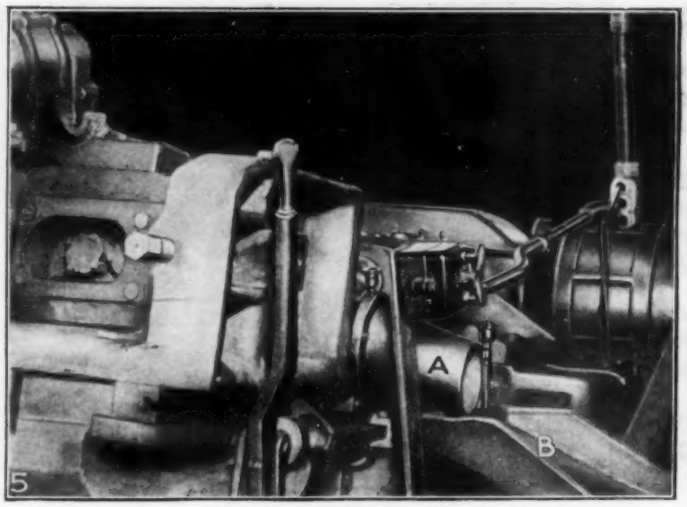
and bottom of the skirt, the inlet and exhaust flanges and the water inlet flange. Points of interest are the spindles *A* at an angle, the plate *B* for setting the cutter, the stocky spindles and the keys for driving the cutters. The bottom flange is then rough profiled and finished by a second operation, being followed by several drilling and reaming operations.

This arrangement necessitates special tools for facing and recessing the combustion chamber. After the preliminary cleaning and inspection a water test is made to prevent any machine work on defective castings. Core holes are drilled, plugged and water tested, after which the first milling operation, Fig. 1, mills the spark plug bosses and also several locating spots on the flange. This is done on a three-spindle Ingersoll machine, the three cutters being very closely grouped. The cutters at *A* mill the flange spots, one of the spots being shown at *C*. The method of clamping the work is shown at *B* and the guide plate for setting the cutters is seen at *D*.

The next milling operation, Fig. 2, machines the top

The rough boring is done on a special four-spindle Foote-Burt machine which is shown in part in Figs. 3, 4 and 5. The spindles are inclined so that the chips work themselves out of the bore instead of packing into the combustion chamber. The recesses around the boring bars, Fig. 3, are to receive the projecting ends of the cylinder barrels. The flange is located on the dowel pins *A* and *B* and rests on the positioning spots shown. One of the holding clamps is shown at *C*.

In Fig. 4 is shown the cylinder block in place, the clamps *A* and *B* holding the block under pressure from the screws *C* and *D*. The clamping blocks can be moved



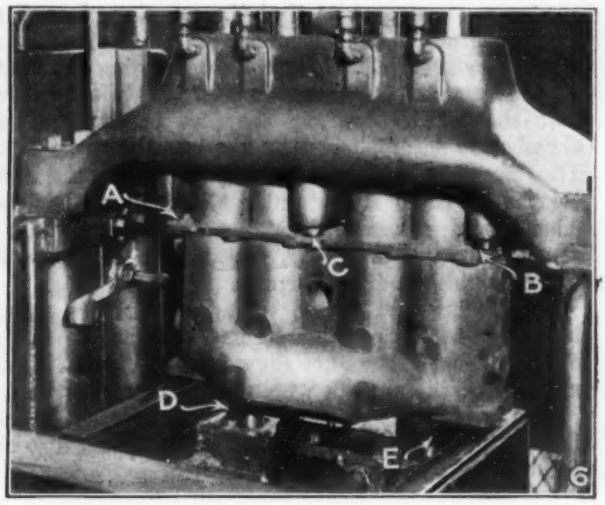


FIG. 5. THE CHUTE FOR CHIPS. FIG. 6. THE SECOND BORING CUT

in and out of position by the handle *E*. The frame carrying the cylinder block moves down over the boring bars and the chips work their way down and out the spout *A* and the chute *B* in Fig. 5. This saves considerable time and trouble and has proved very satisfactory.

The second boring is done on a four-spindle Foote-Burt machine as shown in Fig. 6. Here again the cylinders are located by the bolt holes *A* and *B* and are supported at *C*. Rams *D* and *E* come up from the bottom and force the cylinders in place against the flange. This operation removes from 0.010 to 0.015 in., leaving an equal amount for the final reaming before the grind.

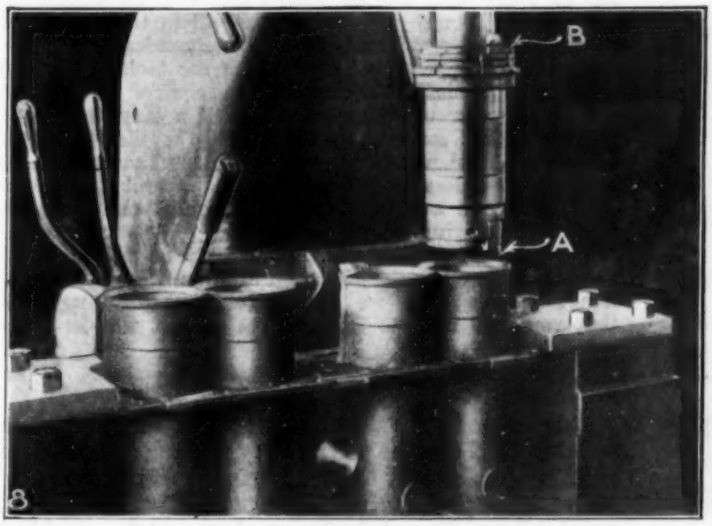
Machining the Combustion Chamber

The combustion chamber is next rough-faced, leaving $\frac{1}{32}$ in. for finish. The tool for this work is shown in Fig. 7. The bar *A* fits inside of the sleeve *B*, which in turn fits inside the cylinder bore and is anchored by the pin *C* entering one of the bolt holes in the flange. The sleeve serves the double purpose of guiding the bar and also preventing any injury to the cylinder wall from the bar itself.

The roughing cutters are held in the cutter head *D*, which has a round projection *E* fitting up into the end of the bar and held by the headless setscrew *F*. This projection, however, does not take any of the driving strains; the tongue *G* on the cutter head forms a key and is driven by the slotted end of the bar.

The fillister head screws *H* prevent the sleeve from slipping off the bar when it is removed from the cylinder. The end view of the bar shows the arrangement of the four cutters, as well as the location of the chip breaking grooves.

Next comes the rough-boring of the combustion chamber. This is done, one cylinder at a time, under a Foote-Burt heavy duty drilling machine as seen in Fig. 8. The cutting tool is shown at *A* and is fed into the work by the action of an angular piece on the collar *B*. The tool is shown in detail in Fig. 9. The main bar A carries an internal bar *B* with a pin through the upper end to prevent its turning. The angular piece *C* slides in a hardened bushing in the bar *A* and when it strikes the adjustable collar *D* it is forced across the angular opening in the bar *B*, moving this bar down by the amount of the space *E* and in turn forcing down the piece *F*. This piece moves the cutting tool *G* into the work, where it continues counterboring for the distance shown. The spring *H* returns the bar *B* to its proper or normal position as soon as the main bar *A*



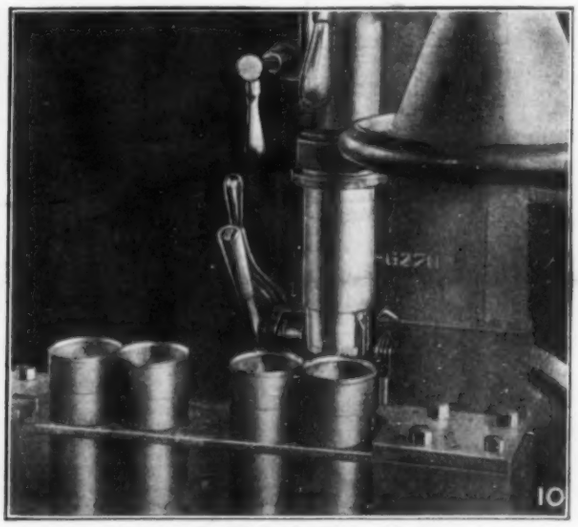


FIG. 8. BORING COMBUSTION CHAMBER. FIG. 10. FINISHING COMBUSTION CHAMBER

has been withdrawn so that the angular piece *C* rises above the adjustable collar *D*.

Another type of tool is used in finishing the combustion chamber and is shown in Fig. 10. The finishing of both the counterbore and the face of the combustion chamber is accomplished by the bar shown in Fig. 11. The bar *A* which is driven by a substantial tongue, carries the collar *B* containing the small springs shown. These springs bear on the sleeve *C* which runs on a ball-thrust collar. The pin *E*, fitting in a bolt hole, holds the outer sleeve from turning.

The facing and counterboring cutters are expanded by means of the angular strips *F* as the bar is forced down. These cutters are shown in the view at *G*, which also shows the way in which the cutters are held.

The bore is chamfered and is next reamed for grinding, in the machine shown in Fig. 12, which also shows the type of finishing reamer used.

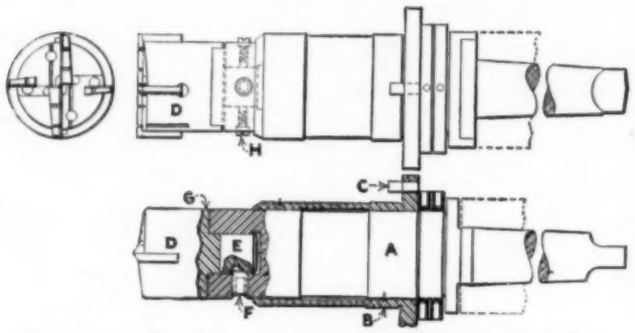


FIG. 7. TOOL FOR FACING COMBUSTION CHAMBER

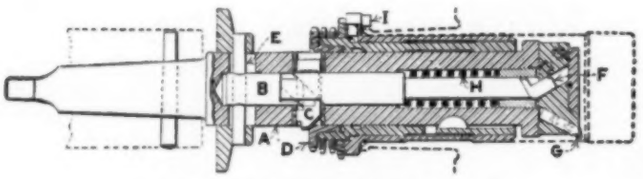


FIG. 9. DETAILS OF BORING TOOL

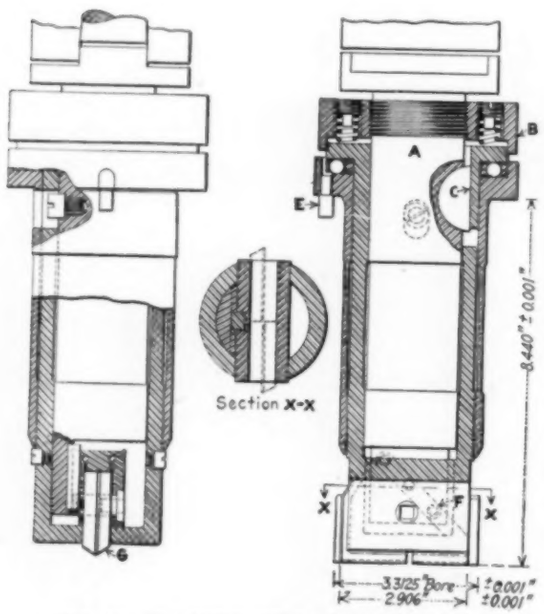


FIG. 11. DETAILS OF FINISHING TOOL

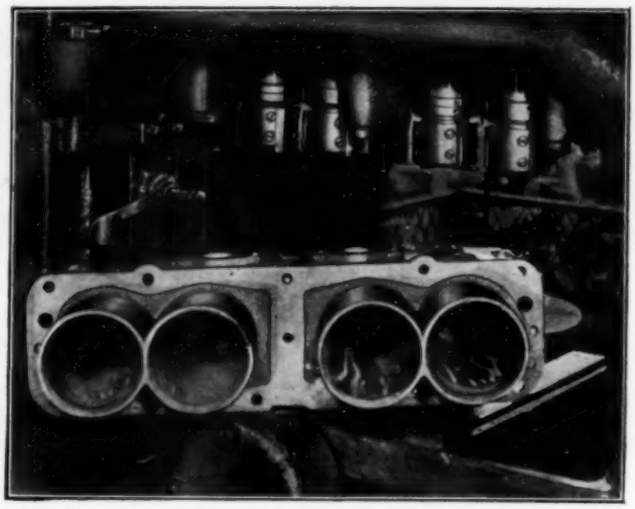


FIG. 12. THE FINISH REAMING

Then follows a number of drilling and tapping operations, including the holes for the oil tubes, the pressing in and spinning of these tubes, pressing in valve stem bushings, and the milling off of the locating spots of the flange. Next comes a heat-treatment to remove all tension from the castings. Then the valve stem bushings are finish reamed, the whole block thoroughly washed and the cylinder bores ground. A final water test, followed by the last inspection, the forty-seventh operation, completes the work.

How One Company Is Trying to Help Business

If buyers and sellers could get together and make known their wants, the sales effected would noticeably improve business because all buyers are sellers and all sellers are buyers.

An approach toward such a getting-together has been made by the S. Rose Company, Inc., of New York, importers of diamonds, carbon and bort, in the following letter sent to a large number of its customers:

Are you interested in improving the general condition of business throughout the country and will you give assistance to a movement to bring about such result?

We are making the following offer to more than one thousand of our customers: In consideration of your placing an order with us, for future delivery, for such goods as you may require in our line, we will in turn, for every order given to us in reply to this communication, place a reciprocal order with other concerns for tools, machinery, metal, and various other commodities required in our plant.

It is our thorough conviction that if a large number of manufacturing concerns would adopt the plan of action as suggested above, it would undoubtedly have the effect of placing orders on the books and thereby encourage production and a distinct feeling of optimism throughout the manufacturing world.

We earnestly suggest that, as executives, you place this proposal before the consideration of your sales and production managers; and we assure you that any suggestion that you may have to offer on the subject will be appreciatively received.

May we look for your advice and assistance in this movement?

This letter is of value because of its suggestiveness, seeming as it does to point a way to dealers in supplies such as small tools to get buying started. Any increase of business would, of course, cause greater demand for supplies of the larger class and for machines.

Planing Flat Gibs

A Difficult Job in Which Proper Clamping Plays a Prominent Part — Bending a Piece to Have It Lie Flat on Table — Tools to Use

BY TELL BERNA
Sales Engineer, The G. A. Gray Co.

TO ATTAIN accuracy in planing it is important to devote attention to the proper methods of clamping the work on the table. Notwithstanding all of the articles and discussions which have been printed from time to time, there are still many planer operators who have not grasped the fundamental ideas involved in clamping their work. The object of clamping is, of course, to prevent the work from shifting while it is being planed. It is very important that this be done in such a manner that the work itself will not be distorted by the clamping device and equally so that the planer table will not be sprung out of shape. It is quite safe to say that most planer work is clamped too tightly.

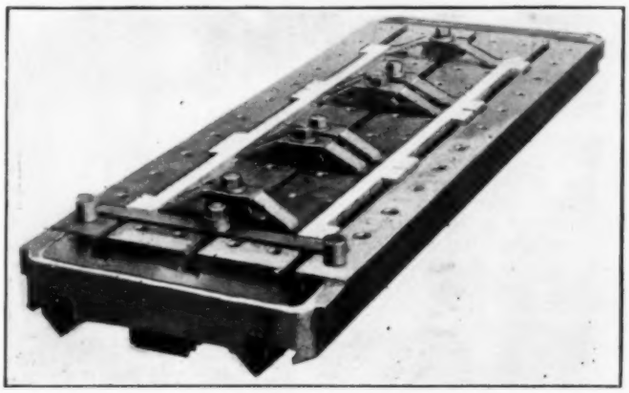


FIG. 1. PLANER TABLE SET-UP FOR PLANING THIN GIBS

A thin flat cast-iron gib is perhaps a particularly difficult piece to plane without springing. Such a gib is so thin that it can easily be bent, yet the highest degree of accuracy is desired so that it may be used without subsequent scraping. A planer table set-up for planing a job of this character is shown in Fig. 1. The relative position of the work and clamps is further detailed in Fig. 2. The block *A* in the T-slot of the table is a sliding fit and under no circumstances a driving fit, since to drive this block into place would tend to spring the table. The gib is pushed firmly against the block *A* by the hardened tool steel shoe *B*. The shoe is in turn clamped against the gib by the spacer *C*, made out of an old file ground to shape. With a clamp at each end of the gib, as shown in Fig. 1, the piece can be firmly held by tightening up on the clamp nut with a 6-in. wrench. It is important that good judgment be used in tightening the nut, since it is obvious that a husky operator can spring the table if he is careless. As the gibs lie end to end, the clamp is not expected to take any of the endwise thrust, which is the greatest force to be resisted in holding the piece to be planed. The end thrust is taken by the strip which is laid across one end of the table. This strip is pushed against two stop pins on the outside edges of the table and then clamped firmly into place by the nut and bolt in the middle T-slot.

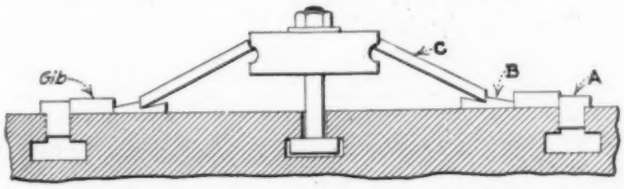


FIG. 2. DIAGRAM OF CLAMP ARRANGEMENT FOR HOLDING GIBS

The first cut is a roughing cut over one of the wide surfaces of each gib, using the round-nose tool of common form, as shown at *A* in Fig. 3, with a feed of $\frac{1}{32}$ in. and removing a depth of about $\frac{1}{32}$ in. This should leave about 0.028 in. of metal to be removed by subsequent cuts. Using too coarse a feed may result in breaking out too large a chip at the end of the cut, thus spoiling the work.

The pieces are now reversed, the surfaces just roughed out being turned down, and it is important that the middle of the gib should be in firm contact with the table, since the clamps hold the gibs only at each end. Before clamping the gib on the planer table it should be held as shown in Fig. 4 and tapped lightly on a block of babbitt, the blow striking on the still unfinished surface. This causes a slight curvature. The gib is then reversed, and when laid on the table its middle will be in contact with the table and its ends slightly raised. The effect of bending the gib can be judged by laying it finished side down on the planer table and pushing one end as shown in Fig. 5. If the gib revolves about its center as indicated by the dotted line at *A*, we know that the ends are raised up and the piece is hollow on top. If the piece revolves about the further end as shown at *B*, we know that it is either straight, or arched, so that it is hollow on the lower side. The purpose of this bending is to make sure that when the ends are clamped down, the entire gib will be held firmly against the table. This can be readily tested by tapping the gib, showing whether there is firm contact or not. If this precaution is not observed, the center of the gib will be slightly raised from the table no matter how hard the ends are clamped; the cutting tool will depress the center of the gib as it passes over the work, and will not result in a straight or accurate job. With the method of clamping described above the gib is absolutely straight after being clamped because it is firmly brought into contact with the table at all points. The second wide surface

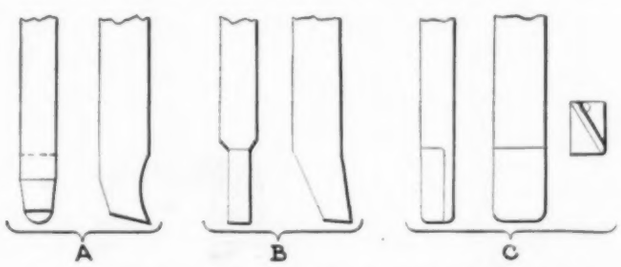


FIG. 3. PLANER TOOLS USED FOR FINISHING GIBS

is then roughed out after which the gib is set up on edge and the edges are roughed out, leaving about 0.020 in. for the subsequent cuts.

The operator should now select on each piece the smoothest of the two wide surfaces and clamp the gibs with these surfaces upward, taking care to see that each piece lies firmly on the table when clamped. The pressure required to hold the gibs for the finishing cuts is, of course, lighter than that required for roughing out and therefore the effort exerted on the wrench in clamping should be correspondingly lighter. Selecting the better surface in this way eliminates the necessity of taking a straightening cut on this surface as a satisfactory finish may be obtained with one finishing cut. This cut removes from 0.006 to 0.008 in., just enough metal to get a true flat surface. For the straightening and finishing cut a square-nosed tool *B*, Fig. 3, is used. This tool is about $\frac{3}{4}$ in. wide and is used with a feed of about $\frac{1}{16}$ in. for straightening and $\frac{1}{4}$ in. for finishing. For finishing steel, the tool shown at *C*, Fig. 3, will leave a very smooth surface.

The gib is now reversed and after the curvature has been reversed so that the piece lies flat when clamped, the other wide surface is planed. This cut is, properly speaking, a straightening cut, removing enough stock to leave 0.004 in. for the finishing cut. Before the latter is taken, all clamps are loosened to permit the gib to change shape so as to relieve any internal stresses. This finishing cut completes the operations on the wide surfaces and should leave the gibs smooth and of accurate thickness at all points. Usually the gibs will be perfectly flat after the last finishing cut has been taken and the clamps have been removed. If, however, they resume a slight curvature it is a very simple matter to straighten them by tapping them on a babbitt block. If the planing has not been properly done, the gibs will not be of equal thickness at all points and it will be impossible to get them perfectly flat on both surfaces.

The narrow edge with the best appearance is now given one finishing cut, and the gibs are then reversed to take the straightening and finishing cuts on the other narrow surfaces. The gibs are invariably reclamped between cuts.

The speeds used are a matter of judgment and experience, and depend largely on the hardness of the

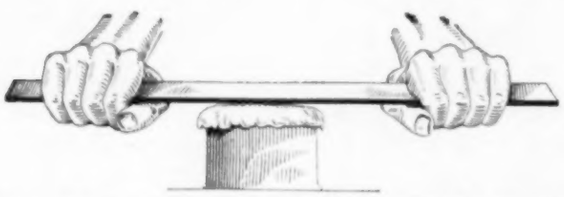


FIG. 4. METHOD OF SPRINGING GIBS BEFORE PLANING SECOND SIDE

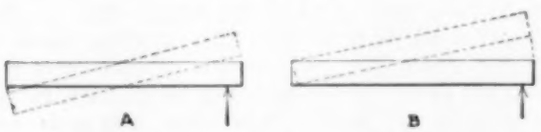


FIG. 5. METHOD OF ASCERTAINING WHETHER GIB IS SPRUNG

metal. Cast iron may usually be roughed out at 48 ft. per minute and finished at 30 ft. per minute; the straightening cuts are taken at 48 ft. per minute. In doing this work on steel strips the speeds are about the same but depend entirely on the hardness of material.

We have in this job a paradox in that the gibs must be bent before clamping in order that they may be straight when finished. It should be clearly understood that the proper clamping plays as important a part in the work as any other element, and unless the operator is willing to give this his patient attention he cannot get the best results.

The Cost of Spoiled Work

SPECIAL CORRESPONDENCE

Although there is, unfortunately, not very much work to be spoiled at the present time, it is, nevertheless, an important point at all times and should be much more carefully considered than is always the case. An excellent poster on this subject is to be found in the shop of the Lodge & Shipley Machine Tool Co., Cincinnati, Ohio, having been prepared by general superintendent Fred G. Kent. It is as follows:

SPOILED WORK

Stop a minute and consider spoiled work. If every man in this shop will appreciate fully what it means, the amount can be cut 90 per cent.

There is, first, the direct loss, which includes the cost of the material and the labor which has been spent upon it. There may be a small scrap value, but otherwise what is lost can never be recoverd. But the direct loss is only a beginning. There are other greater losses. Spoiled pieces must be replaced, usually in a small quantity lot. It costs from three to ten times as much per piece to make ten pieces in a lot as it does to make a hundred; sometimes the ratio is even greater. Also remember that rush jobs are always more expensive than regular jobs, and replacement of spoiled work is always a rush job.

While this small quantity job is being done, there might be made instead of it, some other job which is crowded out of its place in the schedule by the spoiled work. The upsetting of the manufacturing schedule is the hardest thing to put an exact value upon, but is the greatest loss that we have, due to spoiled work.

Remember that raw material not only costs money, but is often very hard to get. Every time the foundry runs on a short lot of a few pieces to replace spoiled work, it is taking time that would produce much needed material for regular work. It is also taking the time of the purchasing department in getting the order for this replacement material pushed ahead of the older orders already placed. Sometimes it is almost impossible to get the replacement material at all, and by the time it is obtained, the work for which it is needed has been delayed beyond the possibility of any approach to efficient production. In certain cases, such delay has caused a loss through penalty, which has more than wiped out any profit on the order. Also, where there are no penalties involved, the shortage on the erection floor will put off the shipment of some given machine at a time when there is nothing else that can be substituted for it on the shipment schedule. This is a loss that can never be made up.

Work that is imperfectly done, so that it must be done over or patched up, may save the direct loss of the material, but the delay due to time spent on it is just as serious and expensive as in the case of spoiled work.

Careful observation of three small rules will help greatly:

First: Make sure that the first piece in every set-up is passed by the inspector before doing any further work on the job. This is a simple rule, and must be obeyed.

Second: If a blueprint is smudged so that you cannot be sure of the figures, or if you are in doubt as to the meaning, put it up to the foreman. Don't guess. Better lose time making sure than spoil work. Don't use an indistinct blueprint; insist on a fresh one.

Third: Don't use a jig or tool that you think is in bad shape, put it up to the foreman. Don't use any jig before you are sure you understand how.

Cutting down spoiled work will save money, increase the production, cheapen the cost and raise wages.

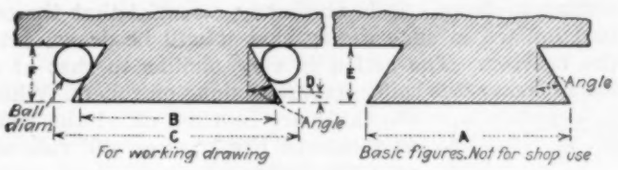
The Dimensioning of Dovetails on Drawings

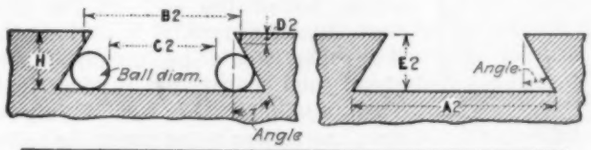
System for Giving All Necessary Figures and Enabling Checking — Two Separate Sketches Made of Each Dovetail—Proper Tolerances for Each Dimension

BY H. M. FUNNELL

THE method of dimensioning dovetails on shop drawings of machine parts should be considered under two headings: (1) The drawing should show the starting or basic point of the dovetail under consideration, so that all future checkings or redesigns can be based on a correct understanding of the original figures. Many times dimensions are given to the nearest convenient fraction, which, considering the taper gib, may be quite correct from the shop point of view; but the fraction gives no clue to the basic figures; and the checker has to calculate and guess in order to determine the starting point or basic figure. (2) The drawing should show all dimensions that are necessary for the shop to have in order to manufacture the part, and these dimensions should be in decimals and fractions, according to their importance.

However, if we put the basic figure on the working drawing, it may cause confusion and questioning in the shop. Therefore, it is suggested that a separate sketch be made of each dovetail part on the detail drawings, one for the shop and one for reference. These separate sketches need not be to scale, but should be clearly marked to indicate what they are for, as shown in the accompanying diagrams. The reason for making a separate sketch of the working dimensions is that, generally, a dovetail is drawn so small that it is not clear where dimension lines are intended to be.





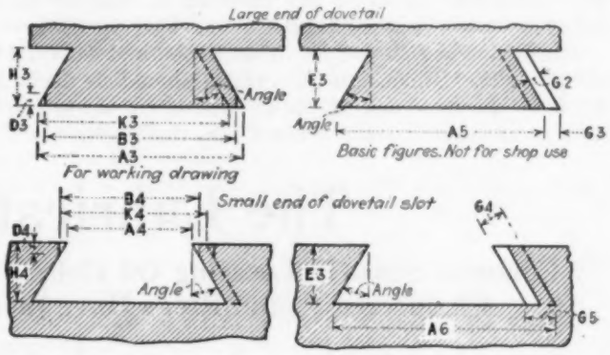
Shop Dim.	Specify Dimension as,	Ref. Dim.	Shop Dim.	Specify Dimension as,	Ref. Dim.
B	Fraction			Decimal	E
C	3-Place Decimal		B2	Fraction	
D	Fraction		C2	3-Place Decimal	
F	Fraction = (E - 1/64 in.)		D2	Fraction	
	Decimal	A	H	Decimal = (E ± 0.002 in.)	
	Decimal	A2			

FIG. 1. LAYOUT FOR DOVETAILS WITHOUT GIBS

Dovetails can be divided into two classes: Dovetails without gibs, and dovetails with gibs, meaning taper gibs, as a gib adjusted by screws is merely a straight dovetail made larger to accommodate the gib.

Considering the first class, or dovetails without gibs, it is obvious that the final adjustment must be secured by scraping to a fit. On the working sketch for this type, Fig. 1, we should show the dimensions marked *B*, *C*, *D* and *F* on the male part of the dovetail; and *B2*, *C2*, *D2* and *H* on the female part of the dovetail. On the basic-figures sketch we should show *A* and *E* for the male part, *A2* and *E2* for the female part, and, of course, the dovetail angle in all cases, and the ball diameter where needed.

It is obvious that dimensions *B*, *B2*, *D* and *D2* should be fractions. The dimension *F* is given as *E*–$\frac{1}{64}$ in. to provide clearance under the dovetail. The dimensions *C* and *C2* are given in three-place decimals, because it is desired to eliminate scraping as much as possible; but since some scraping must be done for the final fitting, there is no justification for giving a four-place decimal.



Shop Dim.	Specify Dimension as,	Ref Dim.	Shop Dim.	Specify Dimension as,	Ref. Dim.
A3	3-Place Decimal ± 0.005			Decimal = (A5 + G3)	A6
B3	Fraction			3-Place Decimal	G4
D3	Fraction			Decimal	G5
H3	3-Place Dec. = (E3 - 015) ± 002 in.		A4	3-Place Dec. ± 0.005	
K3	3-Place Decimal		B4	Fraction	
	Decimal = Basic Slot - G3	A5	D4	Fraction	
	Decimal	E3	H4	Fraction = E3	
	3-Place Decimal	G2	K4	3-Place Decimal	
	Decimal	G3			

FIG. 2. DOVETAILS WITH TAPER GIBS

Dimension *H* is given as *E* ±0.002, because the ball reading *C2* depends upon it; but the same reason as just given does not make it desirable to hold it closer. Dimensions *A*, *A2*, *E* and *E2* on the basic-figures sketch should be in decimals to four places, so that calculations can be made correctly, and thereby avoid addition of errors.

Considering the second class, or dovetails with taper gibs, we have a condition where a certain amount of latitude can be allowed, as we have a take-up by means of the tapered gib. On the working sketch for this type, shown in Fig. 2, we should show the dimensions marked *A3*, *B3*, *D3*, *H3* and *K3* on the male part, and *A4*, *B4*, *D4*, *H4* and *K4* on the female part. On the basic-figure sketch, we should show *A5*, *E3*, *G2* and *G3* for the male part, and *A6*, *E3*, *G4* and *G5* for the female part, showing the dovetail angle in all cases.

Dimensions *A3* and *A4* can be given as a three-place decimal ±0.005, thereby allowing the shop to measure over the sharp corners. The taper gib will take up any error due to the tolerance or to the fine edge being slightly broken. Dimensions *B3*, *B4*, *D3* and *D4* are obviously to be given in fractions.

Dimensions *H3* is given as a three-place decimal, and is equal to the basic figure ±0.002 in., or *E3*–0.015 ±0.002, the reason being that *A3* depends upon *H3*

when the angle is constant, and also that clearance is provided by making it 0.015 less than *E3*.

Dimension *K3* and *K4* should be a three-place decimal, so that the taper for the gib can be ascertained. Dimension *A5* should be a decimal, and is the basic slot minus *G3*. Dimension *E3* should be a decimal, otherwise *A5* would be incorrect, since the angle is always constant.

G2 and *G3* should be decimals, *G3* being put on the basic sketch as a precaution against using *G2* in the wrong plane. *G2* is at the narrow end of the gib space. Dimension *H4* should be a fraction equal to *E3*, any tolerance taken in the shop on a fraction being taken care of by the clearance provided by *H3*.

Dimension *A6* should be in decimals, and is equal to *A5* plus *G3*. Dimension *G4* and *G5* should be decimals. *G4* is at the wide end of the gib space, *G5* being shown as a precaution against using *G4* in the wrong plane.

With the sketches shown on the drawings, errors can be detected with a minimum of trouble, and if the various dimensions are tabulated as shown, it is easy to make all drawings to one standard. The writer once checked up some dovetails on a machine that had been built for years and found out that if the dovetails had been made to the drawings, the machine could not have been assembled. The good sense of the shop foreman and co-operation had put the work through; but imagine the results if work had been let out under contract to another company and it had made the various parts to the drawings, and then could not have assembled them. The result would be that several of the highest-paid executives in both concerns would put in valuable time to straighten it out, when a little more time of a much lower-paid man—and only one man's time at that—would have prevented not only the trouble, but the extra expense as well.

The Lubrication of Bearings

Common Sense in Locating Oil Holes—Bevelled Edges Aid in Proper Lubrication—Chamfered Piston Rings Have Increased Life—Retaining Oil in Bearings

By JOHN S. WATTS

NOTWITHSTANDING that considerable advance has been made in the study of the action of lubricant in bearings, the knowledge so gained is not being applied to many bearings outside of a few in the more important mechanisms. The cause of this disregard of the correct principles of lubrication cannot be other that apathy or ignorance, as there is in nearly all cases no additional cost incurred by applying the lubricant properly.

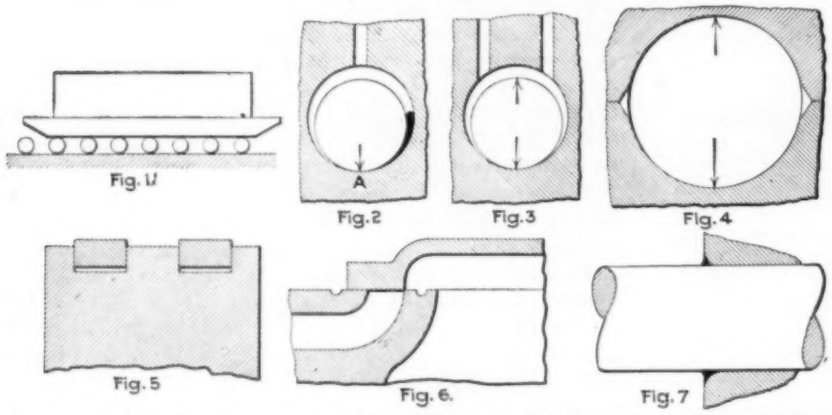


FIG. 1. OIL OR ROLLERS WILL BE PUSHED AWAY UNLESS THE SLIDING MEMBER IS BEVELLED. FIG. 2. PROPER POSITION OF OIL HOLE IN BEARING FOR CONTINUOUS PRESSURE. FIG. 3. PROPER POSITION OF OIL HOLES IN BEARING FOR ALTERNATING PRESSURE. FIG. 4. BEARING RELIEVED AT MEETING EDGES. FIG. 5. EDGES OF PISTON RINGS SHOULD BE CHAMFERED OR ROUNDED. FIG. 6. METHOD OF OILING A SLIDE VALVE. FIG. 7. ROUNDED ENDS OF BEARINGS AID IN RETAINING OIL

In a general way the problem may be stated to be that of first insuring that the oil will get completely between the two surfaces, and secondly that the oil be not permitted to escape before it has completed its work. With forced or flood lubrication a bearing may be successfully oiled even if the oilways, etc., are not laid out as well as they might be, and the common bearing occasionally oiled by a squirt can can be made to use the oil to much better purpose if the oiling arrangements are given a little study.

First take the question of getting the oil between the sliding surfaces. It is absolutely essential that the oil be admitted in such a way that it will be drawn into the bearing. The action is very similar to that of a machine on skids being traversed along on rollers. When the skids are bevelled off at the ends as shown in Fig. 1, they will ride up onto the roller ahead of them quite easily, but if the ends of the skids were cut off square, it is obvious that the roller would be simply pushed ahead and never get under them. Then again, if the weight imposed upon the rollers is too great the rollers will collapse, which is analogous to a bearing having pressure enough upon it to squeeze out the oil.

In a cylindrical bearing the same action takes place as shown in Fig. 1; the shaft being smaller than the hole we get the wedging action indicated in Fig. 2, in which the clearance is exaggerated to show more clearly the way the oil is drawn in between the bearing surfaces. In such bearings the most essential point is to locate the oil-hole so that the oil will be drawn into the bearing easily. To insure this, the oil hole must be at the point where the pressure is least, as shown in Fig. 2, because at that point the clearance between the shaft and the bearing is greatest. It will be obvious that if the oil hole is located at point *A*, it will be difficult if not impossible for any oil to enter, and that what little does get in, will tend to escape from the bearing before it is dragged around to the point *B*, where it is required.

When the pressure on a bearing is a reversing one, as on the main bearing of a steam engine, there should preferably be two oil holes, as in Fig. 3. If owing to the lack of space it is impossible to find room for both oil holes, the single oil hole should be drilled off the

center of the bearing, as otherwise if it is drilled as snown in Fig. 2, the up and down movement of the shaft in its bearing will tend to pump the oil out of the bearing.

A further improvement in this type of bearing is to cut it away at the sides, as shown in Fig. 4. The space so formed acts as an oil reservoir and gives the oil a much better opportunity to get in under the loaded part of the bearing. The part cut away is of little or no value, and so does not reduce the effective bearing surface any appreciable amount. If the bearing should heat up, the effect is for the shell to close in and grip the shaft sideways, thus increasing the friction and quickly causing a dangerous over-heating. As bearings that are cut away at the sides cannot expand enough to grip the shaft, this danger is averted. To prevent the oil escaping at the ends of the bearing, a small portion at each end is left unrelieved.

Returning to flat sliding bearings, it will be clear that if the edges of the sliding part are left square, the effect will be to scrape off the oil and such parts as piston and piston rings should always be slightly chamfered or rounded off as shown in Fig. 5. Actual experience has demonstrated that piston rings so made will outwear those made with sharp corners, because of the oil being able to get between the bearing surfaces.

There are some few cases where it is not permissible to round off the edges of the sliding part such as in steam engine slide valves, the edges of which have to be sharp and square to perform their functions in cutting off the steam. The next best method to adopt in such cases is to cut an oil groove in the stationary part, as shown in Fig. 6, and so long as this groove is kept filled with oil, the slide valve in passing over the groove will pick up some oil at each stroke.

If the principle indicated by Fig. 1 is kept in mind, there need be little difficulty in placing the oil-grooves and holes in any particular case so that the oil will be dragged in to the place where it is most needed. The next point to watch is that of keeping the oil from escaping from the bearing too quickly. Where the oil that escapes is caught in an oil-reservoir and returned to the bearing this problem is solved, but it is not always possible or advisable to arrange this and the next best thing to do is to make the bearing so that the oil will be retained as long as possible.

If a bearing is made (as it usually and wrongly is) with square ends, the oil that reaches the ends will trickle away to waste.

If, however, the ends of the bearing are rounded off as shown in Fig. 7, it will be held in the space, shown in solid black, a much longer time than it otherwise would be.

Holding Down a Job

By W. C. Searle

Holding down a job is made up of two problems. One is having, or being able to acquire, the ability to do the work. That is the technical part. The other is the ability to get along with one's associates so that the friction is not enough to cause a "fire."

I went to work for a concern making a special type of machine. I spent a number of months on the assembly floor and running off machines, then on the road demonstrating and selling.

Here is where I first began to meet the personality problem. The customer was expected to set up the machine according to directions, to run it a certain speed in the proper direction and have fixtures made for holding the work, according to directions sent him from the home office. When this was done the demonstrator came, spent three or four days explaining operations and adjustments, and teaching an operator how to run the machine. Sometimes a test for six to eight hours would be required to set a pace for the operator.

It was the demonstrator's job to make a good impression on the customer, answer all his questions and make the machine stay sold. Naturally the demonstrator must be on his best behavior all the time. He may be exasperated by machines not ready or wrongly set up, but he must not lose his temper as the customer may want more machines.

The worst case I experienced was where the customer had used a machine for a couple of years and had not given it any care. He had then written in telling what poor work the machine did.

I went to see the machine and found it badly battered and covered with dirt showing what abuse it had had. An examination showed that it was a factory job to put the machine in shape to run and I so reported both to the customer and to the home office.

A few days later I received from the home office a copy of a letter written by this customer saying that he was much dissatisfied and that the demonstrator had been there and evidently did not know the machine as he was unable to get any better work from it than he did.

As a matter of fact no work had been produced on this machine for several months and I had not attempted to produce any.

This was one of my failures on the personality side, as I should have convinced the proper person of the correctness of my judgment before leaving the factory.

After a couple of years of this kind of work I went back to the home office as an instructor and was in turn foreman, toolroom foreman and tool designer.

I had my mind set on becoming assistant superintendent for the shop was well equipped and growing larger. The superintendent and I had many discussions and when I thought I was right I stuck to my side, although when a decision was reached I did my best to carry out instructions. I placed too much emphasis in my own mind on the correctness of my mechanical judgment and not enough on avoiding the hard corners of the superintendent's personality.

The result was that after being with this company about five years the superintendent decided he could get along better without me. The manager was very considerate, telling me that because I didn't fit in one place was no reason why I shouldn't get along well in another and gave me ample time to find another job. The superintendent was afterwards factory manager but was finally compelled to leave because of crooked work. But the fact remains that if I had studied him and his methods and reactions more, I could have governed myself so as not to antagonize him and could probably have kept my job.

I have tried to make clear that holding down a job involves not only being able to learn to do the work but also means a conscious studying of one's superior officers so as not to be conspicuously objectionable.

Of course there are some men you cannot work for and retain your self respect. In that case the only thing to do is to get out. But there is nearly always a middle road that can be taken with safety and honor.

Ideas From Practical Men

Devoted to the exchange of information on useful methods. Its scope includes all divisions of the machine building industry, from drafting room to shipping platform. The articles are made up from letters submitted from all over the world. Descriptions of methods or devices that have proved their value are carefully considered and those published are paid for.

Improvised Grinding Machines

By Leonard H. Anderson

In the shops of the Scott & Williams Co., manufacturer of knitting machinery at Laconia, N. H., there is much light grinding to be done upon pieces of such large diameters that any commercial grinding machine capable of swinging them would be, in weight and cumbersomeness of operation, out of all proportion to the actual work. Special machinery was therefore necessary and the best way of providing it was to build up the lathes shown in Figs. 1 and 2, and fit them with suitable spindles to carry the grinding wheels.

It will be noted that the raising blocks are so shaped as to bring the centers well over the back shear. It is never necessary to get the grinding wheel back of the centers and this arrangement renders the full length of the cross-slide available, besides keeping the work back where a piece of large diameter will not project unduly, and be in the way of the operator.

At the moment of photographing the machine, it was set up for one of the smallest pieces that come to it, but thirty minutes later it was swinging a piece to its full capacity.

All of the movements of the original lathe, including the compound rest, are available, and the machine will thus handle any job that may be expected of any grinding machine—external, internal, facing, parallel or tapered.

Rapid removal of stock is not required. Because of the nature of the work that it is called upon to do, the parts to be ground are all within very close grinding allowances, and the small spindle and wheel will take care of the work as readily as a heavier one; besides being much easier to manipulate.

One of the jobs that frequently comes to these machines is the grinding of internal and external radii upon the countless small cam-shaped pieces that enter into knitting machine construction. The machine shown in Fig. 2 is set up for this work.

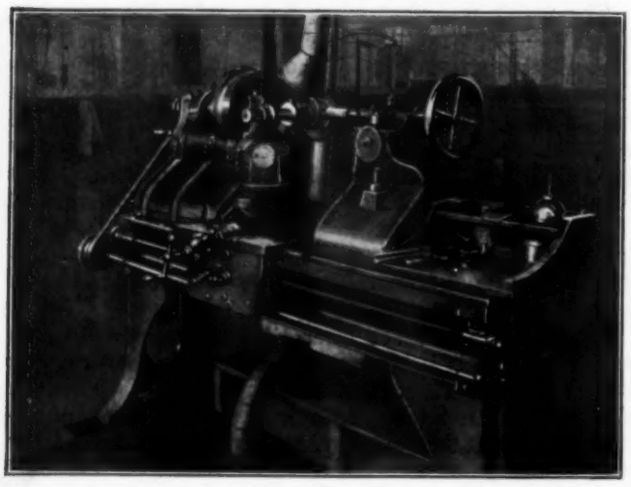


FIG. 1. LATHE FITTED UP AS A GRINDING MACHINE

The large ring mounted upon the faceplate is not a piece to be ground, but is a fixture, to the interior of which may be fastened dozens, or even hundreds, of the small cams; none of which will be more than an inch in its greatest dimension. The pieces are attached by machine screws passing through from the outside of the fixture and entering tapped holes in the cams; the same tapped holes by which they are later secured to their respective places in the knitting machine.

There is no adjustment to the fixture. Its internal diameter must be such that when the cams are attached to it the grinding radius will be correct. A fixture is provided for each size of knitting machine, and also for grinding external radii when that operation is necessary.

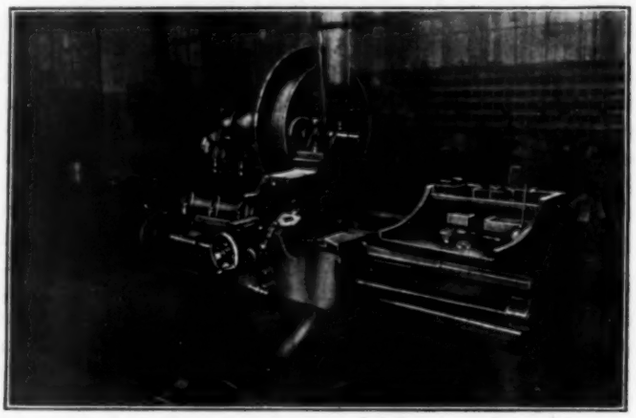


FIG. 2. FIXTURE IN PLACE FOR GRINDING INTERNAL RADIUS ON SMALL CAMS

Circular grooves in the faceplate fit the shoulders of the fixtures so that no time is lost in centering them. If the ring enters its respective groove in the plate and is drawn to place with the screws that pass through from the back of the latter, the operator knows that it is properly located and will run true.

Milling, Facing, and Cutting Gear Segments

By Milton Wright

The turning and facing of gear segments in a lathe are usually rather slow operations because of the intermittent cut which cannot be balanced and the fact that during a large part of each revolution of the work the cutting tool is idle. The illustration Fig. 1, shows how the work is accomplished in one shop by the use of a special device in a milling machine.

The device consists primarily of a frame that can be fastend to the table of the milling machine by means of two T-head bolts and nuts, the frame providing two bearings in which the work arbor is held parallel to

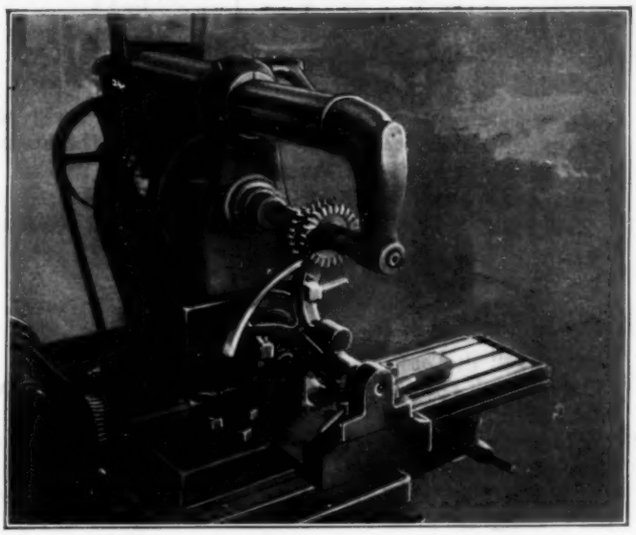


FIG. 1. MACHINING A GEAR SEGMENT ON A MILLING MACHINE

the spindle of the milling machine. The outer bearing is so made that it can be taken off by loosening a single clamping bolt for the purpose of changing the work.

To the inner end of the work arbor is keyed a worm-wheel, driven by a worm which receives its motion from a second worm and wheel, driven in turn by a universal joint that is a part of the regular feed movement of the milling machine. The gearing and one half of the universal joint are carried by a bracket which is an extension of the frame.

The work is held in position upon the arbor by a key, and is further secured by a follow nut which clamps it against a shoulder. The work of milling the outside and facing both sides is done simultaneously by a gang of three milling cutters so proportioned that the central cutter mills the periphery of the segment while the pair of side milling cutters is reducing the face width to the required dimension.

When a piece is finished and removed from the arbor the first worm may be dropped out of mesh with its wheel and the arbor turned back to bring the work-holding key in the right position for starting another piece. After a cut is started the machine may be left to itself until the work is finished and the feed stops, the operator meanwhile attending to other machines.

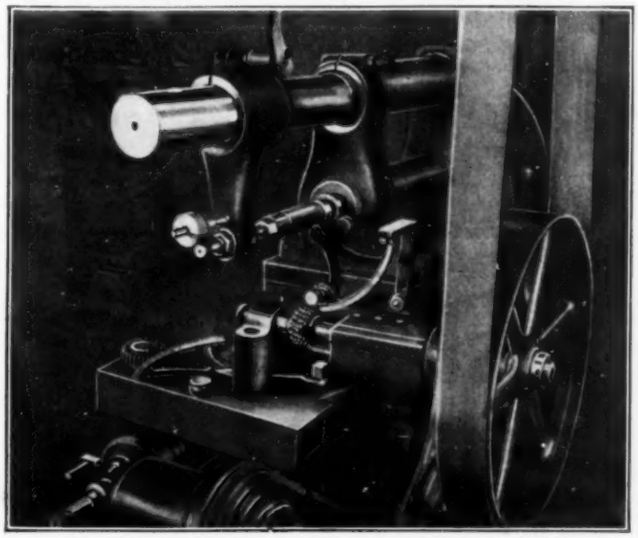


FIG. 2. CUTTING FIVE GEAR TEETH AT ONE PASS

The teeth are cut, five at a pass as shown in Fig. 2, on a Brainard automatic gear cutting machine. The unusual feature of this method is the shaping of the cutters so that five teeth may be cut at once with so little change in tooth form that the segment will run freely with its mating pinion without undue shake.

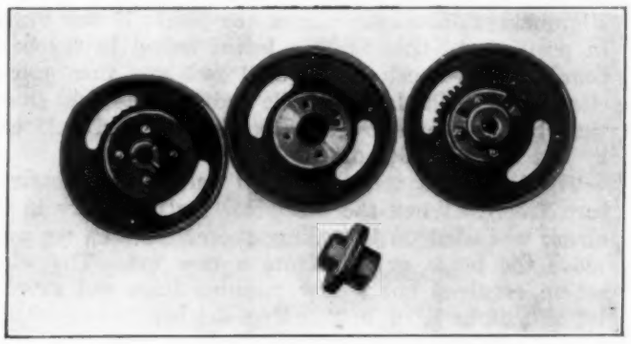
A test block with a pinion, and a stud for the hub of the segment is kept near the machine so that each segment may be tested in mesh with a master pinion as it is taken from the arbor.

Fitting Loom Pulleys With New Hubs

By William Kibler

In our shop we have more than a thousand of the loom pulleys shown in the illustration, more than one-quarter of which have been fitted with new hubs to replace breakages. The new hubs with which the pulleys are fitted enable us to force them on the shaft under hydraulic pressure of ten tons, and pulleys so repaired have never given subsequent trouble in service.

The broken pulleys, one of which is shown at the left in the picture, are centered up, bored and faced to take the new hub which is supplied with a flange



NEW HUBS IN OLD PULLEYS

by which it is bolted to the web of the pulley. The pulley to the right has been fitted with a new hub, while the one in the center has been prepared for the new hub, which is shown below it.

Broaching With a Bearing Ball

By Charles E. Frank

A good way to finish the bore of small drawing dies that must be accurate and have a very smooth surface, is to bore them to within one or two thousandths of the finished size and then push through them a bearing ball of the required diameter.

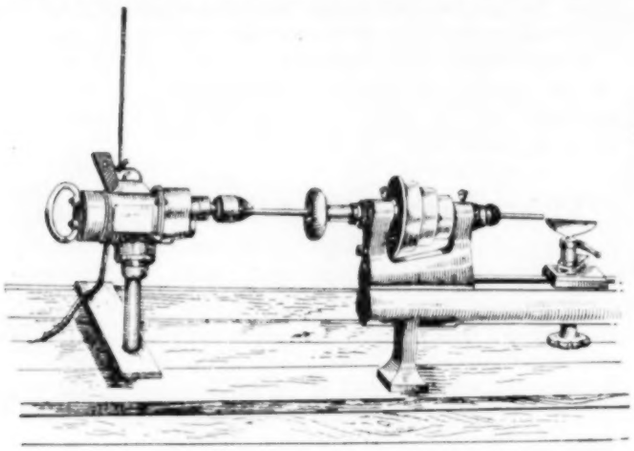
A punch should be made a close, though not tight, fit for the hole and the end cupped to match the ball. It is but the work of a moment to push the ball through the hole with this punch under an arbor press and the finish will be superior to any that can be obtained with a reamer. Plenty of oil should be used.

Bearing balls may be obtained at small cost in almost any of the smaller sizes and one ball will broach, or burnish, many holes. Moreover, in the matter of replacements, the new die will be exactly the same size as the old one if broached with the same ball.

Driving a Bench Lathe with an Electric Drill

By R. W. Hutton

During a temporary shut down we had occasion to make a number of small shouldered studs or pins from



EMERGENCY DRIVE FOR BENCH LATHE

drill rod, and having no power available for the bench lathe, we improvised the method shown in the sketch.

An electric drill was suspended by a stout wire from the ceiling in such a manner that it was practically in alignment with the spindle of the lathe; it was braced in position, as shown, by a board nailed to the backboard of the bench. The drill rod was then passed clear through the lathe spindle and into the drill chuck, thus being rotated by the electric drill and held true by the spring collet of the lathe.

The lathe belt was removed to allow the spindle to turn freely. When the available length of wire in the chuck was used up in making successive pins we could move the brace or substitute a new rod. The whole set-up required but a few minutes time and saved a lot of tedious labor in "pulling the belt."

Handy Screwdriver

By Alfred T. Gregory

On page 938, Vol. 55, of the American Machinist, Charles H. Willey describes a handy screwdriver that can very easily be made. My experience with screwdrivers has been that, while they at times need considerable leverage, they also need a great deal of perpendicular pressure. In the screwdriver shown in Mr. Willey's article it would be difficult to apply much perpendicular pressure, as there is no smooth gripping surface directly over the blade. To overcome this defect I would suggest that the tool be changed to correspond with the sketch herewith. Instead of making the arms straight, I have set them to form an equal angle on both sides. With this screwdriver both parts may be gripped, furnishing a good solid support for perpendicular pressure and also giving a fairly good leverage. If the leverage is not sufficient a pipe or monkey wrench may be requisitioned as was done with Mr. Willey's tool.

HANDY SCREWDRIVER

Repairing a Broken Valve Chest on a Hoisting Engine

By F. C. Sinback

Some years ago the writer had occasion to make an emergency repair on a small hoisting engine, the steam chest of which had been broken out as shown in Fig. 1 because of water freezing in it on a cold night.

The place was a small coal mine and no welding apparatus was available, nor was the machine shop equipment all that could be desired for the handling of such special jobs. Time was the important consideration and I devised the method which I have tried to illustrate in Fig. 2, using the drill press and small lathe, which were the only machine tools at my disposal. The job was prepared for the patch by drilling chipping and filing the edges of the break as straight and as square with each other as possible. Next a piece of cast iron 1⅛ in. thick and of suitable size was drilled out of a scrap casting (the broken frame of an electric locomotive) and the edges chipped and filed to fit as neatly as possible into the break.

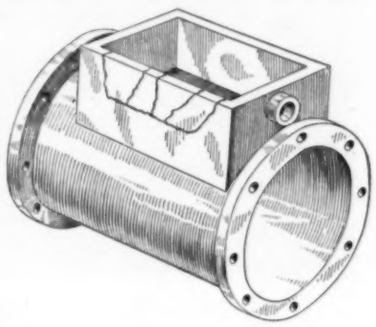


FIG. 1. VALVE CHEST OF HOISTING ENGINE, CRACKED BY FREEZING

This patch was now drilled edgewise for the two shouldered studs shown in Fig. 2, and the drilling continued into the metal of the cylinder, which was then tapped for the studs. The studs were so spaced that their upper ends corresponded to the holes in the cover of the valve chest, and the studs thus served the double purpose of holding down the patch and holding on the cover.

A strip of copper ⅜ in. thick and 1¼ in. wide, with holes to correspond to the studs, was now laid in the bottom of the break, the patch set in and the long-shouldered studs screwed home. Cap bolts through the end walls of the chest into the patch served to draw the end joints up good and snug.

To make these end joints steam tight, ⅛ in. holes were drilled along each joint, as indicated in Fig. 2,

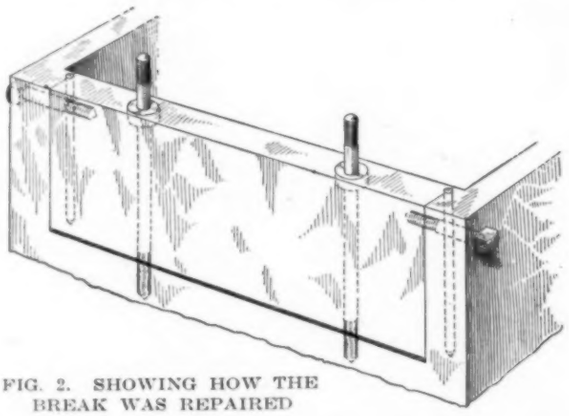


FIG. 2. SHOWING HOW THE BREAK WAS REPAIRED

so spaced that half of each hole was in the patch and half in the end wall, and far enough at one side of the center to avoid drilling through the cap bolts. Soft

copper wire $\frac{1}{16}$ in. in diameter was cut into pieces about $\frac{1}{2}$ in. long and each piece driven in tightly and swaged in place as much as possible by the use of a long hardened steel set a trifle smaller in diameter than the hole.

When the $\frac{1}{16}$-in. holes were thus filled with copper the upper surface of the walls was dressed smooth with a file and the cover put on. A thin caulking tool was used to upset or caulk the copper strip at the bottom of the joint.

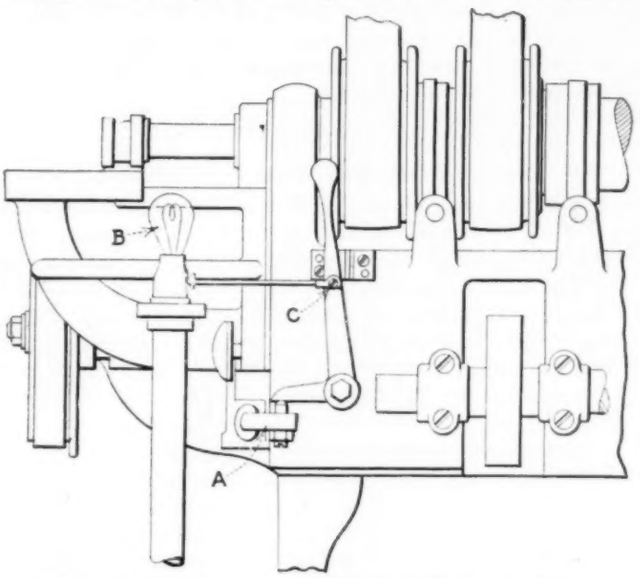
The time of the repair was 12 hours and the joint showed no leakage under working pressure. The repair seems to be permanent.

Signal for Automatic Screw Machines

By D. A. Nevin

A novel method for saving time and increasing the production of a Brown & Sharpe automatic screw machine, is illustrated herewith.

A No. 2 automatic machine was used for performing a second operation on a part made from bar stock in another machine, and all operations such as drilling,



ELECTRIC SIGNAL ON AUTOMATIC SCREW MACHINE

reaming, threading, etc., were performed automatically, as was also the opening of the chuck. The work was loaded into the chuck by hand.

The automatic shut off *A*, with which these machines are equipped, was adjusted so as to shut off the machine after the chuck was opened, but as the operator was in charge of four other machines he was not always aware that the machine was idle. The turret advanced so slowly in operation that its movement could not be discerned at a short distance and the sound of the annunciator bell was inaudible because of the noise of near-by machines operating upon square stock.

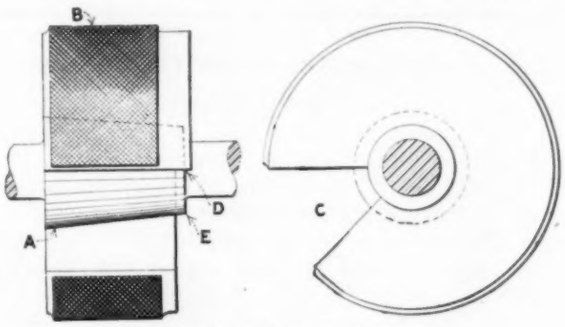
The factory manager devised an automatic signal by mounting the electric bulb *B* upon a stand similar to those used for supporting the stock when fed into the machine. The bulb is connected to the starting and stopping lever by a pull chain which is hooked to the shouldered screw *C*, added to the lever for that purpose.

When restarting the machine the chain is given an extra pull to extinguish the light, as these pull sockets alternate for light and darkness.

An Improved Taper Ring Gage

By W. Burr Bennett

The sketch herewith shows an improved ring gage which has proved very handy in use. It is simply a combination of the step-type taper ring gage and the



IMPROVED TAPER RING GAGE

plate or jaw-type taper gage. Its advantage lies in the fact that all observations are completely visible.

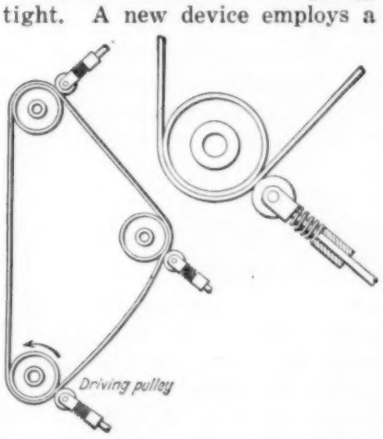
The taper part of a shaft which is to be gaged is shown at *A*, and *B* is the ring gage itself. The ring gage has the usual limit step, as at *D*, for gaging the taper fit on the small shoulder of the piece, but in addition to this a "pie section" or segment is cut out, as at *C*, which allows the inspector to see if the taper is uniform and if it makes good contact with the gage throughout its length. Of course, this gage does not have the advantage of the adjustable feature of the adjustable jaw gage, but in the opinion of our shop it is a distinct improvement over the plain step ring gage.

The gage is made from a good non-shrinking, oil-hardening steel and is either ground or lapped out.

Keeping a Belt Tight

By Harold F. Blanchard

The problem of keeping a belt tight has been solved in a new and original way by an English inventor. Heretofore it has been customary to keep a belt tight by adjustment of the distance between the pulleys; or if this is not feasible, by supplying an idler pulley which is mounted on a spring, which holds the belt tight. A new device employs a small pressure roller, backed by a coil spring. The roller is placed in contact with the belt at the point where the belt becomes tangent to the pulley. A very slight pressure of this roller results in a greatly increased grip of the belt on the pulley. This feature can best be realized by remembering that a sailor can hold a ship by exerting a very small pull on a rope, if he first passes the rope just once around a post. The same principle applies here, except the angle of wrap, instead of being somewhat more than 360 deg., is usually closer to 180 degrees.



DEVICE FOR KEEPING A BELT TIGHT

EDITORIALS

An Important Industry Is Being Handicapped

AVERY good mechanic likes to work at something new, to devise a newer and better way of doing work. And to this desire we are indebted for our advance in manufacturing methods. But as many a good mechanic knows to his sorrow, the cost of developing new machines is disastrous unless this cost can be distributed over a large output, for it seldom happens that the purchaser is willing to pay for the cost of development.

A somewhat similar case exists in connection with aircraft at the present time. Several excellent machines were designed as a result of war demands. The cost of development was high and in order to be reimbursed for this as well as to make a profit, what appear to be very high prices were named in some of the later bids for army planes.

These bids seeming too high, the army custom appears to be to award orders to low bidders whether or not they are the originators of the machine. Orders for a well-known bomber were awarded to a rival concern at a much lower price, a price which incidentally is not likely to pay for the cost of construction.

In the interest of national economy it is necessary that purchases of all kinds be made at fair figures. But great discretion must be shown or we shall greatly handicap a new industry. If the price bid by those who developed special machines at great expense was too high, would it not have been better to effect a compromise if possible, rather than turn the order over to builders who were not familiar with all the details of design and construction? The cost to such builders must include many tools and fixtures with which the originators are already supplied.

Why not lay more of the cards on the table, showing what the development cost was, how much is allotted to cover development, the probable cost of manufacture, and finally, the profit expected, much of which must go for future development? New industries require more considerate treatment than do those already established. And we need to develop our aircraft industries.

For Your Own Good, Listen to the Salesman

DON'T turn away salesmen without seeing what they have—especially now. In days gone by, with the man at the order desk so overworked that he entered orders in his sleep, with the purchasing agent overwhelmed by requisitions, and with the manager thinking production details twenty-four hours a day, it was no great fault to pass up a salesman. But with conditions as they are, if one out of twenty interviews yields knowledge of a machine or tool that can effect a worth-while saving, the time given to all of them has been well spent. And it isn't always well to leave this work to the purchasing agent. In many plants the man in charge of production, or the manager, should be on the job.

Such conclusions are the result of very simple reasoning. Right now every manager should be planning his future methods. Doing so involves studying his present equipment and finding out what there is on the market that will reduce his production costs. In his own interest he should not turn away the man who comes to his office to tell him about improved equipment. These are the times when brains are being worked hard to produce superior machines and tools and they are certain to be successful.

Reports have it that on account of the many machine-tool salesmen on the road, it is becoming very difficult to see a manager. A condition like that should not prevail because the man sent away may be the very one who is packing around real money-saving information. "I'll see him, anyway," expresses a much better attitude than does, "What's the use?"

Inadequate Accident Compensation

WITH the campaigns for safety and the adoption of laws for accident compensation in most states, we have fancied that industrial accidents were almost a thing of the past, a remnant of the dark ages of industry. With this in mind it is both startling and disturbing to note the statements of E. H. Downey, of the Pennsylvania State Department of Insurance, in an address before the American Economics Association at Pittsburgh.

According to Mr. Downey, these laws are all sadly inadequate and the compensation rarely exceeds one-quarter of the financial cost of the injuries. In other words, while we have made a beginning, we have fallen far short of what we intended to accomplish and must take further steps to secure greater protection to the workers in industry.

Another disturbing statement is that preventable accidents still form a very large percentage of an almost unbelievably large total. In six years, industry in Pennsylvania killed 16,000 people and disabled over a million more.

Federal statistics, though not as complete as they might be, indicate that at least 20,000 American workers are killed each year, 100,000 permanently disabled and 2,500,000 injured to the extent of losing working time. These figures indicate clearly that there is still much to be done to bring our industries to a safe and sane point.

Industry has made many strides during the past fifteen years in the humanizing of relations between employers and the employed. But with these figures staring us in the face we can hardly consider the work finished, even so far as physical injuries are concerned. Indifference to the injury of shopmen and failure to compensate fully for injuries received will undo much harmonizing which may have been accomplished by other means. We have made a good beginning—let us see that we carry through to a satisfactory ending.

Shop Equipment News

Boye & Emmes Coneless Engine Lathe

An 18-in. geared-head engine lathe, designated by the builders as a "coneless" lathe, has recently been brought out by the Boye & Emmes Machine Tool Co., Cincinnati, Ohio. Except for the headstock, the reversing gear and the arrangement for mounting the driving motor, this lathe is the same as the standard engine lathe built by the company as redesigned in 1919. At the time the redesigning was done, plans were under consideration for building the coneless headstock, and all parts were made strong enough to meet the requirements of the present job.

A front view of the coneless lathe is shown in Fig. 1 and an end view in Fig. 2. Fig. 3 is a top view of the headstock with the cover removed. No gears are mounted in the cover, which carries only two levers and hardened shifting forks.

Twelve spindle speeds are obtainable by shifting the jaw clutches controlling the action of the thirteen gears in the headstock. Gears are constantly in mesh and run in an oil bath. No gears are shifted endwise. The design is such that it is impossible to engage conflicting ratios of gears, as will be evident if Fig. 3 is studied.

The gears and clutches are all of steel, hardened and tempered in oil, and careful tests have proved them to be more than strong enough to withstand any load that the driving belt will transmit. The clutch jaws have an included angle of 6 deg. and a back angle of 10 deg., which construction facilitates engagement and disengagement. The clutches are broached for a sliding fit on the six splines milled integrally with the heat-treated alloy-steel shafts.

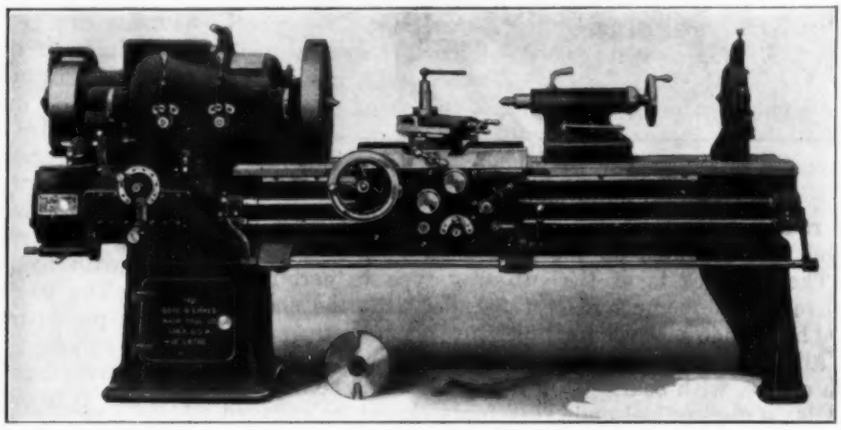


FIG. 1. BOYE & EMMES CONELESS ENGINE LATHE

Specifications: Swing: over bed, 19¼ in.; over carriage, 13¾ in. Journal diameter: front, 3¼ in.; rear, 2¼ in. Journal length: front, 5½ in.; rear, 3 7/16 in. Taper, No. 4 Morse. Diameter of spindle nose, 3 in. Hole in spindle, 1½ in. Tailstock spindle: diameter, 2 5/16 in.; travel, 9 in. Distance between V's; on carriage, 14 in.; on headstock, 9 in. Travel of compound-rest top slide, 4½ in. Cuts threads, 2 to 56 per in. Feeds, ¼ to 224 per in. Lead screw threads, 4 per in. Size of tool bit, ⅝ x 1¼ in. Distance between centers with 8-ft. bed, 4 ft. 2 in. Floor space with 8-ft. bed: 10 ft. x 3 ft.; with taper attachment, 10 ft. x 3 ft. 7 in.; with motor drive, 10 ft. x 3 ft. 7 in. Weight, 4,270 lb.

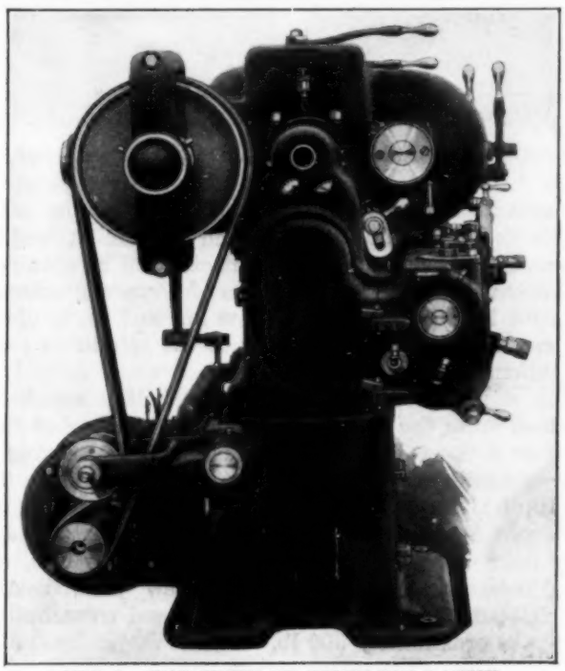


FIG. 2. END VIEW OF CONELESS LATHE

The end view in Fig. 2 shows the even balance of weight obtained by putting the back-gears in front. Drive is from the countershaft or constant-speed motor through belt to the pulley shown at the upper left of Fig. 1, which pulley is connected to the headstock gears through friction clutches for forward and reverse drive. The cabinet leg has two horizontal planed strips, both jig-drilled and tapped, and the upper one with a planed slot. All lathes are finished with these planed strips whether motor drive is ordered or not, thus making it possible to attach a motor at any future time. The motor and an idler pulley are mounted on a base plate which is jig drilled to match the cabinet leg.

The vertical lever to the right of the apron in Fig. 1 starts, stops or reverses the main spindle through the friction clutches mentioned. An auxiliary lever for performing the same functions will be seen a short distance to the left of the apron.

All levers used are either drop forgings or steel castings and the main spindle is a chrome-nickel-steel hammered forging, heat treated. All bearings, including the main spindle bearings, are phosphor bronze. It will be noted from Fig. 3 that the headstock cover does not have to be removed when the main spindle bearings need adjustment.

Any standard make of constant-speed motor may be used, providing it does not have a speed exceeding 1,160 r.p.m. A 3 to 5-hp. motor is recommended. The driving pulley is 13 in. in diameter, and has a 4-in. face for 3½-in. double belt. It should run at 350 r.p.m. which gives a range of spindle speeds from 9 to 350 r.p.m.

The top cover of the headstock has a plug which may

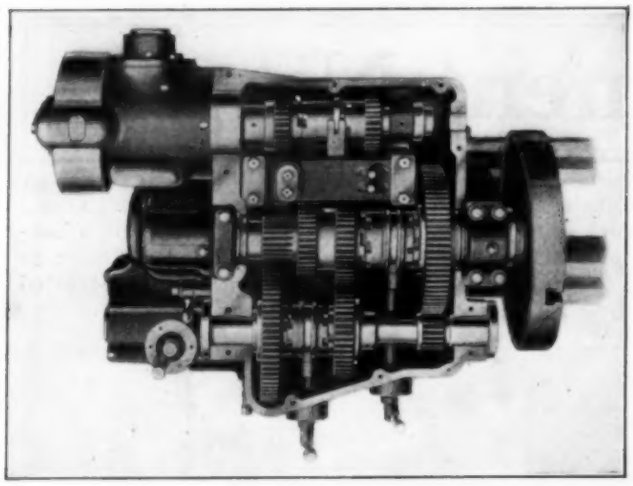


FIG. 3. HEADSTOCK GEARS OF CONELESS LATHE

be removed when oil is needed, and there is a glass oil-level tube mounted on the headstock.

The tailstock is of the cut-away type to permit of swiveling the compound rest parallel with the shears, and has a side set-over for taper turning.

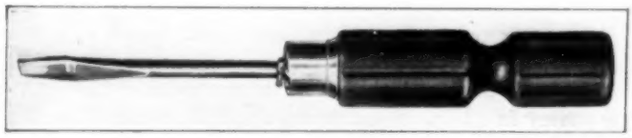
All feeds reverse in the apron, which is of the double-plate type, with bearings on both ends of all shafts and studs. Longitudinal and cross feeds cannot be engaged while screw-cutting. Forty threads, from 2 to 56 per inch, can be cut without changing gears. For metric and odd-size pitches, the stud and intermediate gears may be changed or transposed.

The equipment includes large and small face plates, one pair of centers, a center bush, a steady rest and full set of wrenches. Specifications are shown under Fig. 1.

Chapman Ratchet Screwdriver

The ratchet screwdriver shown in the accompanying illustration has recently been placed on the market by H. D. Chapman, 2929 Clifton Ave., Baltimore, Md. It is manufactured by the G. H. Binder Machine Co., 3407 Clifton Ave., Baltimore. The device is made in three sizes. Its purpose is to enable the obtaining of a strong torque on the screwdriver at the same time that the axial pressure is applied.

The end or top of the handle is rigidly fastened to the shank or blade. The lower part of the handle at the center of the tool is free to rotate about the shank. By means of a ratchet device, this lower handle may be engaged with the blade, so that it is free to turn in one direction only. The ratchet mechanism is so constructed that the direction of free rotation of the handle may be reversed. The tool may thus be used for both tightening and loosening screws, to enable the obtaining of greater turning force. The ratchet mechanism enables speedy operation, and eliminates the necessity of removing the blade from the slot in the screw between each turn that is made.



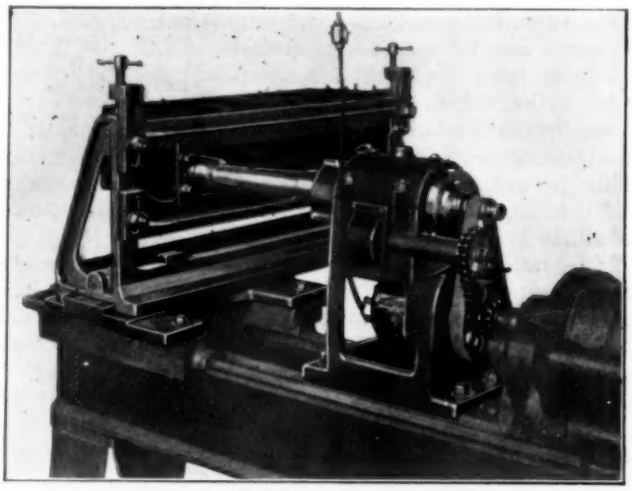
CHAPMAN RATCHET SCREWDRIVER

Liberty "Elteco" Cylinder Grinding Machine

The Liberty Tool Co., 1080 Springfield Ave., Irvington, N. J., has recently placed on the market the "Elteco" cylinder grinding machine shown in the accompanying illustration. The machine is intended for attachment to an engine lathe having a swing of 14 in. or more. The work holder is mounted on the carriage of the lathe, the spindle head is mounted on the ways, and the headstock of the machine is utilized to drive the mechanism for imparting a rotary feed motion to the wheel spindle. The latter arrangement permits of as many changes of rotary feed as there are speeds for the spindle of the lathe.

All sizes of cylinder blocks can be ground, the inside dimension of the angle plate being 33 in. in length. The opening between the parallel bars on the plate can be varied from 2½ to 7 inches. Straps and the necessary screws for holding the blocks in place are furnished. Movement along the bed is obtained by the carriage of the lathe. The work-holding block is provided with a screw 1 in. in diameter for transverse feed. The work is raised and lowered by means of screws placed at each end.

The spindle is mounted in three S.K.F. self-aligning ball bearings, and the main bearing is made of phosphor bronze. It is driven by means of a ½-hp. electric motor, current ordinarily being taken from a lighting circuit.



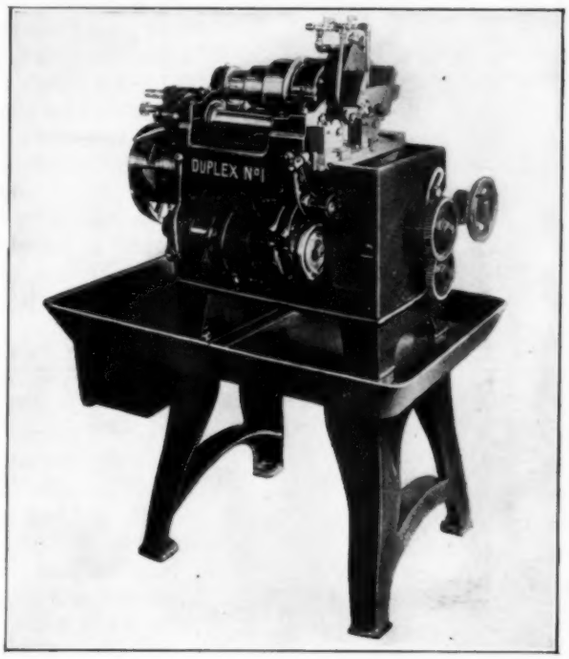
"ELTECO" CYLINDER GRINDING ATTACHMENT ON LATHE

The spindle extension is 14 in. in length; the main spindle is 4¾ in. in diameter and 9⅞ in. in length. An eccentricity up to 1 in. in diameter can be obtained, the amount being varied by means of a screw graduated to 0.0005 in. Cylinder bores from 2½ to 7 in. in diameter can be ground. The speed of the spindle is 5,600 revolutions per minute.

The rotary feed motion of the grinding spindle is obtained from the spindle of the lathe, a sprocket fastened on a taper fitted in the lathe spindle serving to drive a chain connected to the grinding machine. The longitudinal feed of the work is obtained by using the feeds provided for the lathe carriage. The machine is fully equipped with the necessary sprocket wheel, diamond dresser, abrasive wheels, screw jack, holding straps, clamping and drawing screws, and wrenches. It weighs approximately 500 lb.

Brown Duplex Forming and Cutting-Off Machine

The L. P. Brown Machine and Tool Co., Attleboro, Mass., has recently developed a machine for the forming and cutting-off of such small parts as do not require



BROWN DUPLEX AUTOMATIC FORMING MACHINE

the use of turret tools, but which would ordinarily be machined on an automatic screw machine. This machine, shown in the accompanying illustration, provides for the rapid and accurate production of such parts, releasing larger and more expensive machines for work that will more completely employ their functions.

The machine has two spindles, and handles bar stock up to ¾-in. in diameter, producing two identical or dissimilar parts at each cycle. Both spindles are driven through a single three-step cone and spiral gearing. A two-speed countershaft provides six speed changes from 240 to 1,820 revolutions per minute. The driving cone runs on roller bearings.

The feeding mechanism is independent of the forming movements and may be set to feed any length up to 3 in. Or, by providing extra sets of dogs for the feeding cam, it can be made to "repeat" and deliver stock up to 12 in. in length at each cycle. The chucks are adjusted by means of nuts at the rear end of the spindle and may easily be changed. They are so designed that the collets themselves do not move with the feed and thus there is no danger of variable feed, by reason of endwise movement at the moment of closing.

The spindles are hardened, ground and lapped, and run in phosphor-bronze bearings that are adjustable to compensate for wear. The thrust is taken at the rear end of the spindles on hardened steel and phosphor-bronze washers.

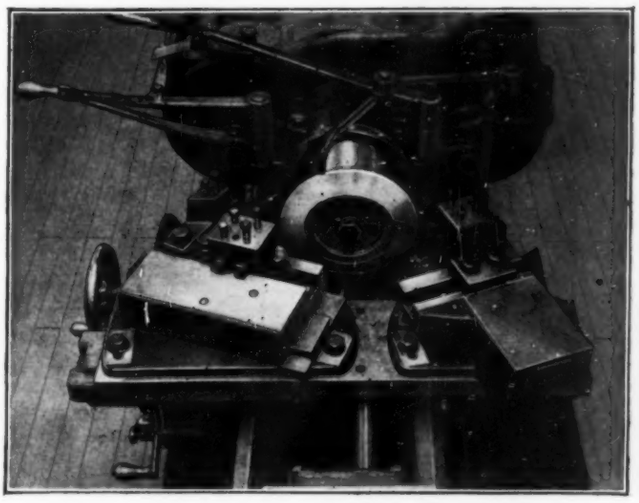
The forming tools are carried upon a single cross-slide and operate simultaneously, though independent adjustment is provided for each. The cutting-off tools are carried upon slides that are disposed at an angle of 30 deg. to the vertical, to allow clearance between the forming and the cutting-off tools. Both cutting-off slides are operated from the same cam and move together, though the toolholders are capable of independent adjustment.

The machine occupies a floor space of 44 in. parallel to the spindles and 26 in. at right angles thereto. The equipment includes a two-speed countershaft, two spring-chucks and feeding fingers, two wire stands, oil pump and piping, and all necessary wrenches.

Warner & Swasey Bevel Gear Attachment

The Warner & Swasey Co., Cleveland, Ohio, has recently brought out an attachment for use on its No. 3-A universal hollow-hexagon turret lathe when machining bevel-gear blanks. The attachment, which is shown from above in the accompanying illustration, can be interchanged with the top slide of the regular carriage, so that the machine may be used part time on other work than bevel gears, if desired. The construction is heavy and rigid, so that cuts to the capacity of the cutting tool may be taken. The device can cut all standard angles on blanks up to 14 in. in diameter.

The two tool slides are operated by the hexagon turret and saddle. The shaft shown between the ways of the machine is mounted on the turret and engages a double pinion in the saddle. This pinion engages also a rack in the saddle, transmitting to it motion toward the rear of the machine. The movement rotates two other double pinions, which engage with racks fastened to the tool slides. The front slide

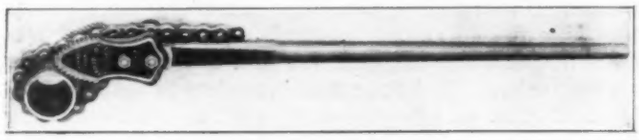


WARNER & SWASEY BEVEL GEAR ATTACHMENT

operates on one side of the gear and the rear slide on the other, both moving at the same time. In this way, faces of bevel gears can be quickly machined.

Armstrong Chain Pipe Wrench

The Armstrong Bros. Tool Co., Chicago, Ill., has recently placed on the market the chain pipe wrench shown in the accompanying illustration. The jaws are



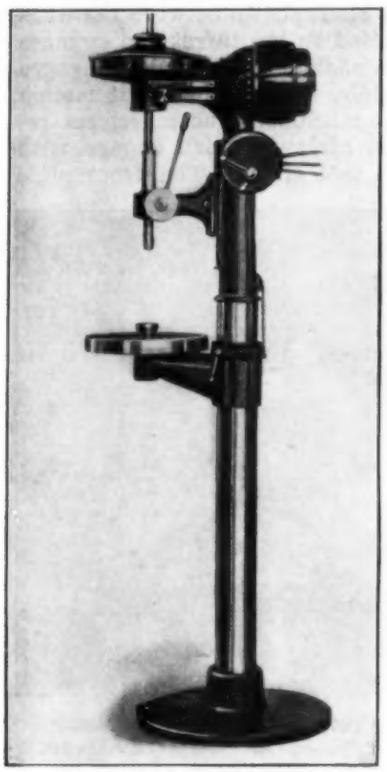
ARMSTRONG CHAIN PIPE WRENCH

provided with long bearings on the bar, and with flanges to guide the chain and to protect it from abrasion. Two chrome-nickel steel bolts serve to fasten the jaws to the bar. The construction is said to prevent the tendency of the jaws to work loose and to spread, thus allowing the chain to become wedged and damaged by pinching.

The handle is forged high-carbon steel, and the jaws are drop forged and hardened. Two types of chain can be furnished, the flat-link style as shown, and the cable-link chain. The wrench is made in seven sizes, for use on pipe and fittings from ⅛ to 16 in. in size. The wrenches vary in length from 20 to 78 in.; in weight from 5¾ to 98 lb., and in length of chain from 13½ to 72 in., depending upon the size of the wrench.

Louisville Sensitive Electric Drilling Machine

The Louisville Electric Manufacturing Co., Louisville, Ky., has recently placed on the market the 12-in. motor-driven sensitive drilling machine illustrated herewith.



LOUISVILLE SENSITIVE DRILLING MACHINE

The operating handles are arranged for ease and convenience of operation. The spindle is made of high-grade spindle steel, and is counterbalanced by a spring. The rotor of the motor and the friction disk are mounted on ball bearings. The maximum driving pull is determined by the weight of the disk, being constant. The friction drive is completely inclosed and so constructed that the friction surfaces are kept free from oil. The speed of the spindle can be easily adjusted. The table is counterbalanced by a weight in the column. The motor and controlling switch are built in the machine. The motor is of rugged construction and can be furnished to suit the characteristics of the circuit available. The machine is made in both the bench or floor types. A V-block, and cup and point centers are furnished as standard equipment.

The capacity of the machine is up to a ½-in. hole in the center of a 12-in. circle. The greatest distance from the table to the spindle is 39 in., the vertical adjustment of the table being 32 in., and that of the spindle arm 8 inches. A ½-hp. motor running at 1,725 r.p.m. is used. The speed of the drill spindle varies from 450 to 1,200 r.p.m. The maximum height of the machine with the spindle up is 76 inches.

Pangborn Portable Sand-Blast

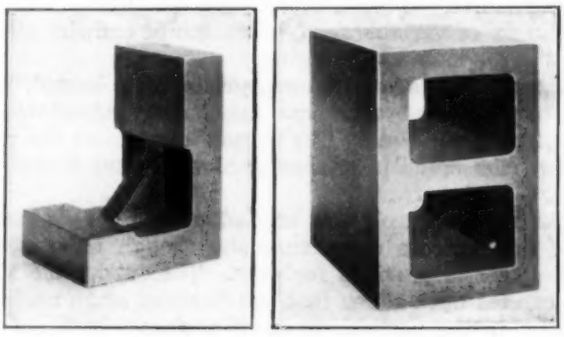
The Pangborn Corporation, Hagerstown, Md., has recently placed on the market a hose-type sand-blast of such small size that it can be picked up and easily carried by the operator. The hose machine consists of a suction-type gun, with the blast action controlled by a trigger in the handle. Compressed air passing through the air jet creates a vacuum, by which the sand or metallic abrasive is brought from the hopper to the gun body. The body forms a mixing chamber for the air and abrasive, and gives it a swirling action, increasing the effectiveness of the blast stream. Quickly interchangeable nozzles, one being shown on the floor in the accompanying illustration, make possible the use of the device on a variety of work. The blast operates on any air pressure from as low as 5 lb. up to 100 lb. The operator is usually protected by a special helmet and heavy gloves.

PANGBORN PORTABLE SAND BLAST AND CABINET

A small cabinet that can be set over the hopper of the hose sand-blast can be supplied, the illustration showing it in use. It furnishes a means of cleaning small parts, being a complete and self-contained continuous-operation cabinet sand-blast. In this case, the operator is not exposed to flying particles, but views the action through the glass.

Simplex Precision Toolmakers' Knee and Box Parallel

The Simplex Tool Co., Woonsocket, R. I., has recently placed on the market the precision toolmakers' knee shown at the right of the accompanying illustration.



SIMPLEX BOX PARALLEL AND TOOLMAKERS' KNEE

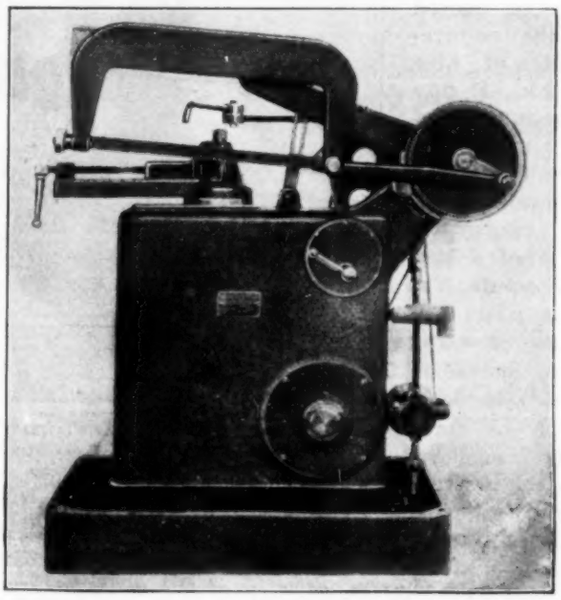
The device is particularly adapted to use on gage and small work of a light character, and may be employed for both inspecting and laying out work of this nature. It can be used either with or without a magnetic chuck, being clamped directly to any desired surface. The knee is made in one size, 2½ x 3 x 4 inches.

The precision box parallel shown at the left has also been placed on the market very recently. This device is intended for larger work than the ordinary parallels, and is for use in either the machine shop or toolroom for inspecting and laying out large work. It is made in four sizes from 4 x 4 x 6 in. to 6 x 14 x 16 inches.

Both the parallels and the knees are made of the best grade of cast iron and ground to a very smooth and accurate finish.

Louisville Motor-Driven Hack-Sawing Machine

The motor-driven hack-sawing machine shown in the acompanying illustration has recently been placed on the market by the Louisville Electric Manufacturing Co., Louisville, Ky. The motor and control switch are built into the machine in such a manner as to be out of the way and protected from injury. The machine is of



LOUISVILLE MOTOR-DRIVEN HACK-SAWING MACHINE

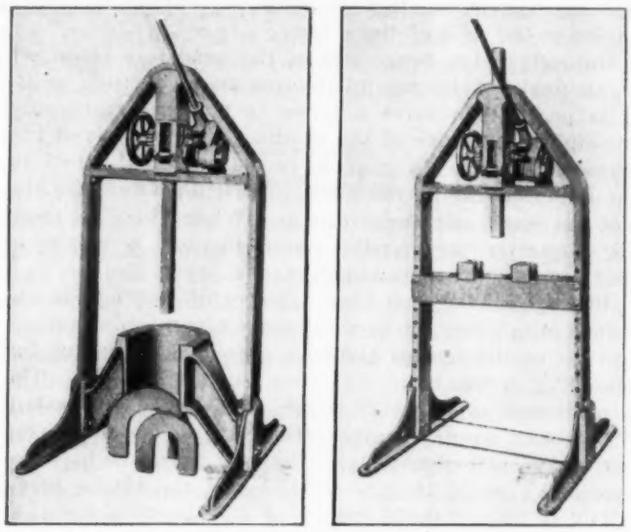
symmetrical design, and the controls are conveniently located for operation.

The vise swivels, and is graduated to facilitate cutting angles. The stroke is adjustable from 5 to 7 inches. Two speeds, 45 and 90 strokes per minute, are provided, so as to suit the work. Stock up to 5 in. thick can be cut. The saw blade is 16 in. in length. Since the saw slide is above the blade, chips can not fall between the sliding surfaces.

The feed is by gravity, and the saw arm can be raised and held in any position. An automatic stop is arranged to stop the motor when the piece has been cut off. The motor is fitted with ball bearings, and can be furnished for the circuit available. It has a capacity of ½ hp. An oil pump can be furnished. The machine can be mounted on wheels to make it portable. It is 36 in. high, occupies a floor space of 18 x 36 in., and weighs 450 lb.

Evansville Garage Arbor Presses

The Evansville Arbor Press Co., Evansville, Ind., has added to its line the hand-operated arbor presses shown in the accompanying illustration. The presses are in-



EVANSVILLE GARAGE ARBOR PRESSES

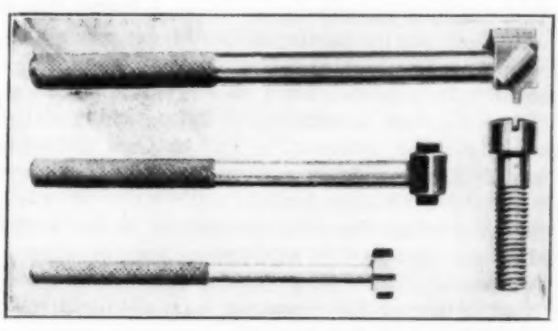
Specifications: Diameter of work accommodated: No. 8, 30 in.; No. 9, 40 in. Largest arbor opening, 8 in. Capacity over table: No. 8, 27½ in.; No. 8-B, 36 in.; No. 9, 30 in.; No. 9-B, 44¾ in. Height: No. 8, 72 in.; No. 9, 77 in. Floor space: No. 8, 38 x 40 in.; No. 9, 36 x 51 in. Net weight: No. 8, 585 lb.; No. 8-B, 450 lb.; No. 9, 715 lb.; No. 9-B, 585 lb.

tended especially for automobile repair shops and service stations, and are each made in two sizes.

Presses Nos. 8 and 9, shown on the left are made with stationary cast-iron tables having 10-in. openings. Two U-shaped castings are furnished, with which the size of the opening may be reduced to fit different classes or sizes of work. The table on the Nos. 8-B and 9-B presses, shown at the right, consists of a pair of adjustable side bars. The larger size, No. 9-B, is constructed of a heavy 6-in. channel frame bolted to cast-iron bases. The channel uprights are 40 in. apart. The side bars which form the table are adjustable to any height, this table being equipped with steel sliding supports for use when straightening shafts and rods. The operator stands directly in front of the work while using the press. Quick return of the ram is obtained by means of the handwheel. Adjustable friction rollers bear against the ram.

Porter Utility Offset Screwdriver

The Porter Products Corporation, with offices at Syracuse, N. Y., and factory at Brewerton, N. Y., has recently placed on the market the utility offset screw-



PORTER UTILITY OFFSET SCREWDRIVER

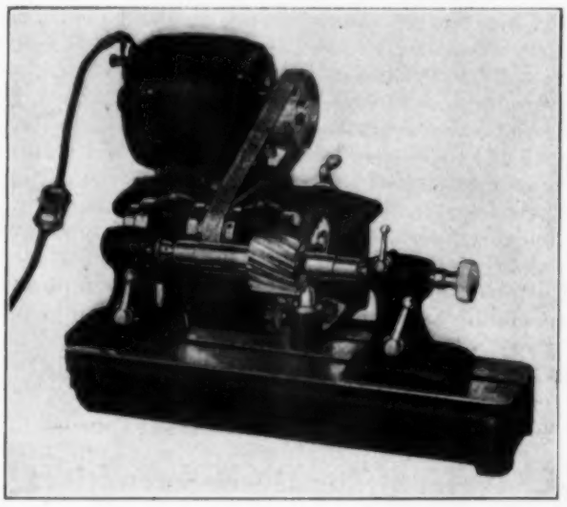
driver shown in the accompanying illustration. The device is intended for working in close quarters, being developed especially for automobile use, where compactness of construction prevents the use of the ordinary screwdriver. The device operates on the same principle as a wrench; that is, with the handle at right-angles to the axis of the screw.

On each of the four sides of the head is a blade set at an angle of 45 deg. to the one on either side of it. It is possible to drive a screw in a place where only one-eighth of a turn of the handle about the axis of the screw is possible, a quarter revolution of the tool in the fingers bringing the blade in position to engage the slot for each successive stroke. When there is room for a quarter turn on the screw, the tool is rotated a half revolution between each stroke.

Because of the fact that a powerful leverage is obtained on a screw, large wood screws or machine screws can be easily set up tightly. The tool is useful for loosening screw bolts that have rusted in place. The screwdriver is made of tough steel and heat-treated. The blades are accurately machined, so as to engage the screw slot positively. The tool is made in three sizes, $\frac{1}{4}$, $\frac{3}{8}$ and $\frac{1}{2}$ in., the thickness of the blades being 0.040, 0.050 and 0.078 inch.

Liberty "Elteco" Portable Bench Cutter-Grinding Machine

The accompanying illustration shows a cutter-grinding machine recently placed on the market by the Liberty Tool Co., 1080 Springfield Ave., Irvington, N. J.,



"ELTECO" BENCH CUTTER-GRINDING MACHINE

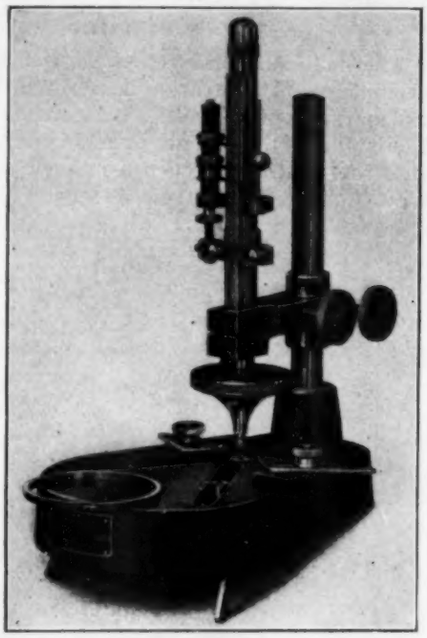
under the trade name of "Elteco." The device is easily portable, and is intended for use on a bench for cutter grinding ordinarily performed on larger machines. No countershaft is necessary, the machine being driven by a motor taking power from the lighting circuit.

The motor has a capacity of $\frac{1}{4}$ hp., being driven by either direct or alternating current, as required. It is mounted on a slide so as to adjust the tension of the belt by which it is connected to the wheel spindle. The spindle carrying the abrasive wheel is hardened and ground and mounted in adjustable taper bearings, so as to compensate for wear. The wheel head is provided with a transverse movement of 4 in. obtained by means of a crank-operated screw.

Work requiring straight grinding is mounted on centers, the swing being 7 inches. The maximum distance between the centers is 9 in. For the grinding of cutters requiring angles or tapers, an attachment not shown is provided for mounting on the table. The longitudinal movement of the attachment for feeding the work is $1\frac{3}{4}$ in., the feed screw being operated by a crank. The machine is fitted with a grinding wheel, two arbors, and with two special studs equipped with spacing collars for holding the work while grinding on angles.

Coats Piston-Ring Prestometer

The Coats Machine Tool Co., Inc., 110 West 40th St., New York, N. Y., has recently placed on the market the instrument shown in the accompanying illustration for gaging the thickness of piston rings. The device consists of the prestometer fluid micrometer gage mechanism fitted to a special base suited to the requirements of the work. It provides a means of very rapidly inspecting the thickness of piston rings and work of a similar nature. The base plate is made of cast iron, instead of case - hardened steel, as formerly employed for the prestometers. The reason for the use of iron is that the steel plates are apt to warp and become bulged in the center. The base is fitted with collapsible legs, so that it can be either tilted or used in a flat position, as best suited to the position of the operator and the needs of the work.

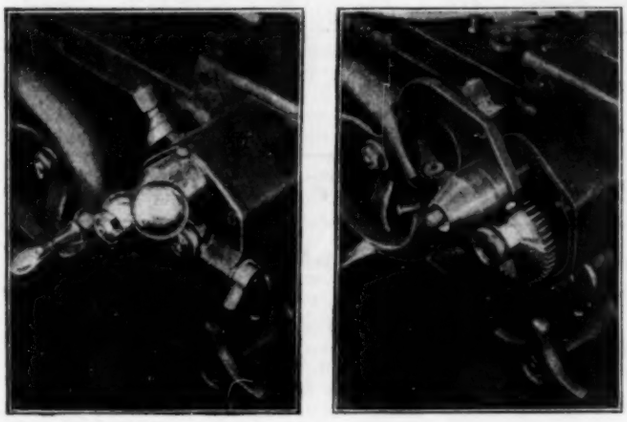


COATS PISTON-RING PRESTOMETER

The wing back stops facilitate the setting of the work. The chief feature of the device is in the two slots, extending radially at 60 deg. to each other from the point of contact of the measuring ball. These two slots hold contact points that are adjustable in position, so as to accommodate rings of any diameter up to 5 in. The piston ring rests on the two movable contact points and on the stationary one directly under the ball of the prestometer, thus giving a three-point support and removing the ring from contact with the base while it is being gaged. The contact points consist of standard $\frac{1}{4}$-in. steel balls. These balls may be easily removed from the holder by means of a pin, so that they can be replaced when worn. It is necessary to make the contact points renewable, because of the fact that freshly ground rings show a considerable abrasive action when they are slid across the contact points continually

Cross-Slide Stop for Worcester Lathes

A stop for limiting the movement of the cross-slides of lathes has been devised by the Worcester Lathe Co., Worcester, Mass. The device is applicable to any lathe of this concern's manufacture, without other alterations of the machine than the substitution of a cross-feed screw with a longer shoulder. The illustration shows two views of the device, the view at the left giving the normal position of the parts, while at the right the handle has been removed from the screw, the hold-



CROSS-SLIDE STOP FOR WORCESTER LATHES

ing screws withdrawn from the cover and the latter swung to one side to disclose the working parts.

Referring to the view at the right, a pinion keyed to the cross-feed screw is at all times in mesh with a gear which turns freely on a stud set into the back of the case. The ratio of reduction is three to one. Back of the gear and turning upon the same stud is a worm wheel, meshing with a worm keyed to the short spindle that terminates in the knurled adjusting knob and graduated dial at the left side of the box.

In adjacent faces of the gear and worm wheel are stop pins, one pin in each part and located at the same radial distance, so that when the worm wheel and gear are close together the pins will interfere. The gear cannot, therefore, turn through a complete revolution. The cam lever, shown at the left of the box, operating in a groove in the hub of the gear, serves to slide the latter to and from the worm wheel, so that the stop pins either will or will not interfere, according to the position of the lever.

In cutting a thread, or in other work where the tool point must be fed in by small and definite increments, the cross-slide is run forward in the usual manner with the device inoperative, until the tool point is nearly or quite to cutting position. The cam lever is then turned forward to slide the gear toward the worm wheel. The knurled knob, and through it the worm wheel, is now turned back until the stop pins are in contact, thus setting a positive stop for further forward rotation of the cross-screws.

To allow the tool point to advance 0.001 in., the dial is turned forward one graduation, thus slightly separating the stop pins and allowing the cross-feed screw handle to be turned forward by that amount. Because of the large reduction obtainable through the worm and worm wheel, the 0.001-in. graduations on the dial are spaced ¼ in. or more apart. This permits of adjustment of the tool within very close limits.

The advantage of the device lies in the fact that the stop is imposed against the rotation of the screw, instead of against the forward movement of the slide. Therefore, no excess pressure inadvertently applied to the handle will move the tool beyond its predetermined limit, for the reason that such excess pressure cannot be transmitted to the slide. By turning back the cam lever, the device is thrown out of action without disturbing its setting. The slide may then be run forward or back at will, and returned to its former position with certainty by merely turning the lever to re-engage the stop pins.

Farm Machinery Needed in Italy

Improvement in the demand for agricultural implements in Italy has been noticed of late, which seems to presage the end of the suspended business in agricultural supplies resulting from the "buyers strike" of last spring, which was caused largely by the high cost of American machinery through the sharp rise in dollar exchange.

American machinery retains its popularity, but the low cost of production in European countries is a serious factor, which the American manufacturer must take into consideration in order to maintain his hold in this market. Plows are being manufactured in Italy at the rate of 3.10 lire per kilo, as compared with 3.70 to 3.80 lire at the beginning of the year (1 lira = $0.193 U. S. currency at normal exchange). Due to the low exchange value of the mark, Germany is offering plows as low as 3 lire per kilo. The same condition prevails regarding other implements. For example, German mowers are being offered at 1,400 lire and American mowers at 2,300 lire. However, the German machine is very inferior to the American, and this superiority is appreciated by Italian buyers.

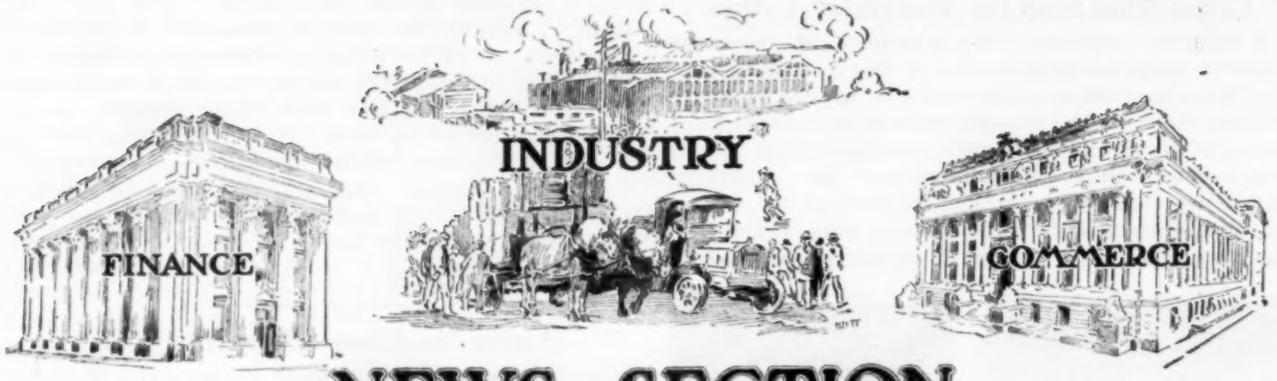
There are protective duties on practically all agricultural implements, the duty on tractors being especially high. It varies from 60 to 95 gold lire per quintal, the variation depending on the weight of the tractor. This seriously affects the importation of foreign tractors and results in most of the demand being supplied by Italian manufacturers.

In 1920 the United States supplied 37,674 quintals of the 125,276 quintals representing the total importation of farm machinery in Italy, or 30 per cent, against 79 per cent of the total imported the previous year. The exports of implements from the United States to Italy in 1920 were 35 per cent less in value than for 1919, and for the first nine months of 1921 they showed a decrease in value of 75 per cent as compared with the corresponding period of 1920.—*Commerce Reports.*

Railroad Equipment in Russia

Production of locomotives and railway cars in Soviet Russia by the twenty-one factories engaged in this work shows a considerable decline for the first six months of 1921, as compared with the latter half of 1920, the contributing causes being lack of provisions and scarcity of fuel, as stated in a report from Consul Leslie A. Davis, at Helsingfors, Finland.

Twenty-one locomotives were constructed during the first six months of 1921, compared with 39 for the last six months of 1920, while only 229 cars were built during the former period as against 257 during the latter period. Construction of rolling stock has decreased each year since 1915 and practically none is now going on.



NEWS SECTION

The week of February 5 to 12 is National Smile Week

Perfect Package Campaign a Success

Shippers of the country made a score of 99.10 per cent in the "Perfect Package Campaign," according to a recapitulation of the results of the movement just announced by the joint campaign committee of the American Railway Association and the American Railway Express Co., which conducted the campaign throughout the country last November. Reports of the business handled and the number of exceptions taken on packages, because of some error or defect in packing, marking or registration, were tabulated in Chicago.

During the "Perfect Package Month," as November was designated, the railroads were credited with handling 9,339,745 freight shipments, to which 101,760 exceptions were filed by the carriers. During the same period, the express company handled 10,899,352 shipments, to which 81,070 exceptions were taken. In other words, all of the carriers handled 20,239,097 shipments, freight and express, on which 182,830 exceptions were entered by carriers, giving a national percentage of 99.10 per cent.

These figures were tabulated from reports received, up to December 22, 1921, from 1,294 cities in the United States, divided into five classes, according to population. The exception reports covered errors made by shippers in the packing and marking of shipments, and in making out bills of lading or express receipts. A number of the smaller communities failed to forward their reports in time and were not included in the recapitulation.

—*SMILE*—

To Build Shipyards at Budapest

A correspondent in Europe informs us that the firm of Schneider-Creusot Co., which is known as the "Krupp" of France, has entered into a contract with the Hungarian government to construct a huge commercial port at Budapest. The improvements will include extensive docks, large storage buildings, repair shops and shipyards. According to the terms of the contract, the Schneider-Creusot firm will hold a monopoly for the entire exploitation of the port for a period of sixty years, after which time the Hungarian state takes possession.

Commerce Commission Considers Freight Rates

That railroad rates on iron ore should be reduced materially has been the contention of many witnesses appearing recently before the Interstate Commerce Commission during the consideration of the case which involves a review of the rate structure of the entire country. P. S. Sprague appeared for the Lake Superior Iron Ore Association. His argument dealt chiefly with the rates from the mines to the upper Lake ports, but the need for the reduction also applies between the Alabama mines and Southern furnaces. Closely linked with this demand has been the insistence that the rates on pig iron must be reduced before any material reduction in the cost of steel can be effected. The present rate on pig iron was declared by some witnesses to be throttling the whole foundry industry.

Judging from questions asked and the general attitude of the commission, it seems probable that rates will be reduced on basic commodities, particularly on low-class freight. It is very evident, however, that the commission is going to be absolutely sure that the transportation machine is not impaired by these reductions. The members of the commission in each instance are calling for facts and figures and apparently are not convinced that a reduction in rate in many cases will mean increased revenue through an increased volume of business.

Practically all witnesses agree that coal should be favored in the matter of reductions. The general opinion seems to be that coal rates should at least be relieved of the 1920 increases. In that connection, it is pointed out that iron ore rates have not been increased to the same relative extent as have the rates on coal.

—*SMILE*—

Machinery Tax-Free in Italy

An article under the heading "Tariffs and Trade Regulations," in *Commerce Reports* for Jan. 30, advises that the Italian government has reinstated the provisions of a decree authorizing the admission of machinery and construction material for use in establishing new industries or for use in new industrial procedures installed in old industrial establishments free of customs and consumption taxes.

Non-Magnetic Compass for Aircraft

Much thought has been given to the development of a non-magnetic compass light enough for use on aircraft. Many engineers have been at work on it and some very definite plans have been under way for at least two years, although no such compass was on the market. The Bureau of Standards now announces that after a year's work on the problem it has produced a compass of this type, crediting the idea and its development to Drs. Paul R. Heyl and Lyman J. Briggs, both of the bureau.

The action is said to depend upon a revolving coil of wire and is claimed to function very satisfactorily both in straight flying and in stunting airplanes. The weight is given at 13 lb., which is little more than half the weight limit set by air service men.

—*SMILE*—

Foundrymen Change Meeting Place

Final arrangements have been made for holding the annual convention and exhibit of the American Foundrymen's Association and allied societies in Rochester, N. Y., during the week of June 5, instead of in Cleveland as was previously announced.

This decision was reached following Conferences on Jan. 18 and 19, with Mayor Kohler, of Cleveland, at which time it was learned that due to the incomplete condition of Public Hall, it would be impossible to hold the convention in Cleveland. The activities will be held at Exposition Park.

—*SMILE*—

Federal Commission Frees Machinery Builders

The Federal Trade Commission has dismissed complaints of unfair competition against certain companies engaged in the manufacture and sale of road machinery. The companies are: Buffalo-Steam Roller Co., Buffalo, N. Y.; Barber Asphalt Paving Co., Philadelphia, Pa.; Dyar Supply Company, Cambridge, Mass.; Universal Road Machinery Co., Kingston, N. Y.; New England Road Machinery Co., Boston, Mass.; and Buffalo-Springfield Roller Co., Springfield, Ohio.

The Swiss Machinery Industry in 1921

BY A CORRESPONDENT IN THOUNE

The Swiss machinery industry went through a severe crisis in 1921. The export trade has greatly decreased, due partly to the large stocks of raw material which were bought at high prices and which have not yet been consumed, but chiefly on account of the depreciation of foreign exchange. The price of pig iron fell from 30 francs per quintal in January, 1921, to 17 and even to 15 francs in November and December. Copper dropped from 215 to 173; zinc from 512 to 350; steel from 47 to 27; seamless tubes from 128 to 54, and so on down the line. Labor conditions also contributed largely to the depression. The establishment of the 8-hr. day and higher wages has had a disastrous influence upon the industry. In several branches of the machinery industry the working day has already been prolonged and wages have been reduced, in the first attempt to come back to pre-war conditions.

The locomotive industry alone has had no reason to complain as it suffered very little from the general depression. This is due chiefly to the fact that on account of the electrification of the Swiss Federal Railways, as well as most of the private lines, considerable orders for electric locomotives were placed. The manufacture of steam locomotives has largely decreased. This branch of the Swiss industry has lately received some orders from abroad.

MACHINE TOOLS OVERSTOCKED

The machine tool industry, however, was not as active. The home demand was very small, manufacturers buying only the tools that are absolutely necessary; stocks of American, German and English machines are still plentiful and imports of these tools into Switzerland has been reduced to a minimum. The activity in the motor and accessory industries, though not to be compared with former years, was in some respects satisfactory. Exports of embroidery from Switzerland fell from 215,000,000 francs in 1913 and 425,000,000 francs in 1919, to 134,000,000 francs in 1921. The demand for cotton and woolen spinning and weaving machinery was also very small.

The automobile industry suffered very badly. The sale of war stocks, especially of heavy motor trucks, had a deplorable influence on this industry and one of the largest Swiss manufacturing plants was obliged to shut down on account of a lack of orders. The large electric manufacturing plants of the country profited by the numerous orders placed by the railways, and also booked quite a few important orders from foreign nations. Several larger orders were received for turbines, dynamos and motors. The demand for agricultural machinery and implements is also small, the local market being well supplied by foreign manufacturers.

Since the autumn of 1920, the paralysis of the buying power of Switzerland has become more and more evident. The low rate of exchange enables other countries to replace the high-priced Swiss machines by their own cheaper makes, thus diminishing the export market.

Some Statistics on Japanese Machine Tool Imports and Exports

Comparison of export figures, Great Britain, U. S. A. and Japan:

		All kinds of machines	Machine tools only
Great Britain	1913	370,000,000 yen	10,000,000 yen
	1920	374,000,000 yen	21,700,000 yen
U. S. A.	1913	.....	32,000,000 yen
	1920	494,000,000 yen	96,000,000 yen
Japan	1920	17,000,000 yen	800,000 yen

Imports of machine tools into Japan were:

	In weight, lb.	In price, yen
1912	12,600,000	3,960,000
1913	9,950,000	3,280,000
1914	7,690,000	2,480,000
1915	2,390,000	890,000
1916	3,200,000	1,780,000
1917	6,240,000	3,200,000
1918	8,900,000	6,640,000
1919	10,240,000	10,560,000
1920	14,470,000	13,650,000

Machine tools imported into Japan during 1920 were:

Lathes	4,800,000 yen
Turret lathes	100,000 yen
Planers	380,000 yen
Shaping machines	500,000 yen
Vertical planers	280,000 yen
Drilling machines	800,000 yen
Milling machines	1,580,000 yen
Boring machines	700,000 yen
Gear-cutting machines	20,000 yen
Sawing machines	40,000 yen
Hammers	500,000 yen
Compressors	50,000 yen
Bending machines	40,000 yen
Punching and shearing	190,000 yen
Grinding machines	210,000 yen
Miscellaneous	150,000 yen

A comparison of the numbers of foreign and domestic made machine tools, actually in use in shops of shipbuilders and ship repairers follows:

	Domestic %	Foreign %	% of Whole
Lathes	49.6	50.4	38.7
Turret lathes	41.8	58.2	1.2
Planers	50.6	49.4	4.7
Shaping machines	58.8	41.2	3.7
Vertical planers	56.5	43.5	2.3
Drilling machines	49.6	50.4	17.1
Milling machines	47.6	52.4	3.1
Boring machines	26.4	73.6	4.2
Gear shapers	46.2	53.8	0.8
Sawing machines	48.0	52.0	0.4
Hammers	59.1	40.9	3.7
Presses	47.1	52.9	0.8
Compressors	64.2	35.8	1.6
Bending machines	58.1	41.9	1.8
Punching and shearing	60.2	39.8	5.7
Grinding machines	50.1	49.9	6.5
Miscellaneous	61.4	38.6	3.7

Comparison of the numbers of foreign and domestic made machine tools, actually in use at 150 works.

	Domestic %	Foreign %	% of Whole
Lathes	66.6	33.4	42.0
Turret lathes	59.9	40.1	2.3
Planers	53.0	47.0	3.8
Shaping machines	63.4	36.6	4.2
Vertical planers	61.3	38.7	2.0
Drilling machines	51.7	48.3	15.6
Milling machines	47.7	52.3	2.3
Boring machines	46.3	53.7	6.2
Gear shapers	23.7	76.3	1.1
Sawing machines	43.6	56.4	1.3
Hammers	49.6	50.4	1.1
Presses	63.6	36.4	1.6
Compressors	31.2	68.8	596
Bending machines	56.1	43.9	0.6
Punching and shearing	54.9	45.1	3.5
Grinding machines	37.2	62.8	4.2
Miscellaneous	52.9	47.1	1.9

The following figures were compiled from diagrams issued by the Japanese government's statistical bureau:

	Production of all kinds of machines in the country	Exports of all kinds of machines from the country	Exports of machine tools only
1915	2,000,000 yen	.....	.....
1916	8,500,000 yen	8,500,000 yen	.....
1917	10,000,000 yen	9,200,000 yen	640,000 yen
1918	19,000,000 yen	15,800,000 yen	1,000,000 yen
1919	13,500,000 yen	16,700,000 yen	960,000 yen
1920	9,500,000 yen	17,000,000 yen	800,000 yen

Patent Office Bill Passes House

Despite the opposition of such influential members as majority leader Mondell and Chairman Madden of the Appropriations Committee, the House passed without amendment the Patent Office relief bill by the overwhelming vote of 305 to 44. The Senate Committee on Patents expects to consider the bill immediately and it is known that a majority of the committee favors the reporting of the bill to the Senate on the earliest possible date.

The opposition to the bill was based largely on the ground that increases in salary, in some cases amounting to as much as 50 per cent, are being allowed to one group of employees. If the same salary scale were applied to the three hundred thousand other employees of the Government, outside the postal service, it would mean a tremendous increase in the Federal expenditure. Messrs. Mondell and Madden urged that Patent Office employees await the passage of the Lehlbach reclassification bill which has already passed the House.

Mr. Mondell contended that the higher rates are too high and the personnel provided is unnecessarily large.

The main three provisions of the bill are that it provides a substantial increase in salaries, particularly to the technical employees of the Patent Office; it provides for an increased personnel, and authorizes an increase in fees sufficient to cover the increased expenditures. Due to the low salary scale, the Patent Office has lost a large percentage of its more experienced examiners and workers with technical experience. During the last sixteen months there has been a turn-over involving one-fourth of the total force of 437 examiners. As pointed out by Representative Vestal of Indiana, who was one of the active supporters of the measure, this has caused the work to be handled much more slowly until the work of the office is 60,000 applications behind. It also was pointed out that the work in the Patent Office is increasing by leaps and bounds. During the calendar year of 1919 the number of patent applications totaled more than 76,000—exceeding by 19,000 the number of applications filed in 1918. The 1918 total was exceeded by 24,000 applications in 1920, and 1921 exceeded 1918 by 30,000 applications. In 1921 there were 87,408 applications for patents, 5,596 applications for designs, and 16,234 applications for trade-marks, making a total of 109,238 applications. This is an increase in work during four years of 65 per cent.

Technical societies and other organizations are largely responsible for the pressure which forced the passage of the bill over the protest of House leaders. This support came principally from the National Research Council, American Engineering Council, Manufacturing Chemists Association, American Institute of Electrical Engineers, American Patent Law Association, National Association of Manufacturers, American Society of Civil Engineers, American Society of Mechanical Engineers, National Automobile Chamber of Commerce, Automotive Electrical Association, Electrical Manufacturers Club, American Institute of Mining and Metallurgical Engineers, American Bar Association, and the American Chemical Society.

Manufacturers Urge American Valuation Principles

American valuation will be endorsed by the Senate Finance Committee. This is the conclusion of most of those who attended the special tariff convention of the National Association of Manufacturers, which was held in Washington, Jan. 30 and 31. The delay on the part of the committee in agreeing to the plan laid down in the bill passed by the House of Representatives, has been due to the determined opposition of two Republican members of the committee. This was revealed when delegations of manufacturers called on the Senators and Representatives of their respective states. The names of the two Senators, who are held to be responsible for the delay, were not disclosed.

The gathering of several hundred manufacturers from all parts of the country demonstrated that there is little division of opinion among them as to the necessity for levying the ad valorem duties on American prices. This opinion is so universally held because manufacturers generally believe that no equitable foreign value can be arrived at with currencies in a jumble and with opportunities favoring more than ever the undervaluation of foreign-made goods.

The convention listened with careful attention to a detailed statement by H. E. Miles, of Racine, Wis., who appeared in opposition to American valuation.

Fraudulent Valuation

One of the most significant features of the convention was the establishment beyond any reasonable doubt that under-valuation and fraud are practiced to a very considerable extent by many foreign producers. The testimony of men who have first-hand information in this connection was convincing on that point. Among the others who brought out that phase of the situation was William Burgess, of the United States Tariff Commission. He told of several trips which he had made abroad to investigate fraud in the valuation of commodities intended for sale in the United States. The extent of under-valuation "went far beyond my anticipation or greatest guess," he said.

"The great body of the importers," continued Mr. Burgess, "are just as honest as is the great body of manufacturers, but one dishonest importer can have a very demoralizing influence. He can import his goods, valuing them at such a price that will demoralize the other importers and compel them either to go out of business or to follow his examples. I have made six trips to different parts of Europe and another to the Orient to look into the matter of valuation. I was made to realize the impossibility of finding true foreign market values. On one trip I developed the fact that I could not get a wedge into any information for two months after my arrival. Afterwards I found that it was on account of a ring, tied up with certain officials of our own Government who had advised the manufacturers on the other side that I was coming over and to look out for me. I had a commission from one of the largest houses in this country to make such purchases for its account as would establish a true wholesale selling value abroad. The man who was honestly endeavoring to find out the prices and purchase the goods for me was boycotted. Orders were issued from New York to see that he got no more goods. Every manufacturer in that line in France, in Germany, in Holland and in Belgium refused to sell him goods. He was ruined financially."

Walter Camp, of Connecticut, in the course of his remarks said: "This is the Garden of Eden. This is the place where they all want to come. This country is the place where they want to fish and they want us to cut bait. Do not be deceived by those who are interested in telling us that we must have a big export trade now that our factories are so expanded. Do not follow false counsel and let those who give it come in behind you and take the domestic trade which constitutes 90 per cent of our business, while you are chasing poor credit customers who consume 10 per cent of our output."

An original communication from a member of the German economic council was presented at the convention, showing how German manufacturers, barred from many countries, are forced to sell goods at such low prices in the United States that in some cases they have put Japanese plants out of existence. A substantiated example was given in the form of a thermos bottle which cost 9.2 cents to make in Germany. The cost on a similar article made in Norwich, Conn., was $1.011.

It was contended that the American valuation plan is only a form of administration and has nothing to do with rates. It was declared repeatedly that it is the only recourse against fraudulent valuations and is absolutely necessary to break up the form of manufacturers who ship their goods to themselves in this country. If a manufacturer invoices goods to himself he can value it at nearly any price that he may choose.

"On to Germany"

One of those who spoke told how the Board of Appraisers at New York had sent a highly qualified agent to Germany in an effort to get the proper value of the German product. He went to the manufacturing town and endeavored to get the value. His presence was discovered and both the Mayor and the Chief of Police advised him to leave the town as soon as possible. In fact he was followed through the streets and was branded as an American spy. He was denied all information. This was cited as characteristic of the difficulty in establishing values in a foreign country.

Herbert J. Wynne, of Rochester, N. Y., told of a trip he made to Germany last October. Out of 400 first-class passengers, 300 were men headed for Germany to buy anything they could buy. One of the passengers confided to Mr. Wynne that he had a letter of credit in his pocket for $250,000 and he expressed the hope that he would be able to spend every cent of it in Germany. "You know, you get very intimate on shipboard," said Mr. Wynne, "and I was told more tricks than I ever believed existed. I was told how to cheat the United States Government and particularly how I could cheat the German government."

Mr. Miles, who appeared in opposition to the American valuation, declared that there is nothing in the thermos bottle example that can be stopped by American valuation. It is like taking a headache powder for corns, he said. It would take 1,000 per cent duty to protect against that German thermos bottle, he pointed out, and the American people never have stood for more than a 50 per cent duty and even that rate could not be applied very frequently. You can save the cutlery industry by a 500 per cent tariff, but that is like shooting into a crowd of friends because there is one man in the crowd you want to get. You would have to cut loose forever from England, our greatest buyer; from Canada, our second greatest buyer, and from all the people with whom we fought in the war. Prices of 329 different articles retailed in stores increased 260 per cent from 1914 to 1919, Mr. Miles said. Under American valuation the tariff would go up 260 per cent. He urged that the tariff be handled so that the people will respect it and not turn on it and force it down to an unreasonable level. "There is some under valuation," said Mr. Miles, "but it applies on a very small percentage of the imports."

The convention adopted a memorial urging the President and Congress to retain the provisions of America valuation in the Fordney tariff bill. A committee of ten was appointed by the chair to present these views to the parties named.

—*SMILE*—

Crissinger Suggests International Exchange

A suggestion for the stabilization of international exchange, made recently in a public address by D. R. Crissinger, comptroller of the currency, has attracted wide attention in financial circles. The following paragraphs give his ideas stripped of detail.

The history of monetary systems, under a fair analysis, will justify the conviction that it is possible to create a special medium of accounting and settlement for an especial class of transactions, namely, those in international trade, and gradually to lift this trade above the ruck of disorganized domestic money conditions.

Whether such an institution should engage in deposit and discount operations, has been the subject of much discussion. That it should do so, confining its operations carefully to the furtherance of international trade, would not be at all difficult to contemplate.

Such an institution might issue an international currency, or it might conduct its operations in the terms of American dollars, Swiss francs, Dutch guilders—of any money system that is recognized as securely on a gold basis. Former Secretary of the Treasury Shaw recently proposed the employment of the American dollar in settlement of international transactions, pointing out that the amount of dollars that would require to be actually shipped from country to country in settlements would be almost ridiculously small in proportion to the volume of business done. The idea of an international trade banks is not essentially different, and it would appear more effectively because it would not be subject to the charge that the money and banking system of a particular country were getting too great a prestige. It is not impossible or impracticable, provided we have vision, imagination and initiative enough to lead us to a careful exploration of possible methods.

The Business Barometer

This Week's Outlook in Commerce, Finance, Agriculture and Industry Based on Current Developments

By THEODORE H. PRICE
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Business would be better in the United States if thoughtful men were not somewhat alarmed at the recklessness of the public borrowing that is being planned. At Albany a measure that calls for the expenditure of $329,000,000 in improving the port of New York is being favorably considered. State or City bonds will have to be sold to raise this money. As to the cost of the Federal bonus proposed, the Secretary of the Treasury says that it is estimated at from $1,500,000,000 to about $5,250,000,000. The minimum amount immediately required is put at $425,000,000 a year for the next two years. This sum represents the interest on ten billion dollars for a year at 4¼ per cent.

State bonus legislation which calls for many millions is pending in Colorado, Connecticut, Delaware, Florida, Indiana and Maryland. In other states the bonus bond issues made or definitely in contemplation aggregate $424,000,000, and Massachusetts has already distributed $20,000,000 among her soldiers, most of which has been raised by taxation.

It is estimated that over $1,250,000,000 will be expended in road construction this year. Bonds will be issued to raise most of this money and because tax exempt securities can be so readily sold nearly every political community in the country is pledging its credit to get funds that will be given away or spent for public improvements that may or may not be essential.

Will Bring Inflation

No one can even guess how much money will be thus provided and disbursed within the present year. The total can hardly be less than two billion dollars, in addition to the regular Federal, State, City and County budgets. The result must be a general increase in taxation and while the first effect of putting all this money in circulation will be to raise prices and inflate credit, those in whom the instinct of thrift still survives are really aghast at the remoter prospect.

I know that to be of any value this letter must be a practical common sense interpretation of the week's business news, rather than a recital of the meaningless details of the various markets, and I am therefore moved to say that since it seems presently impossible to check the prevailing extravagance in public expenditure we must be prepared for the inevitable but meretricious boom that it will inspire. Whether it be wisely or wastefully spent the expenditure of two billion dollars will put a lot of people at work and the wages earned will be used to buy the things that are for sale.

This is, in fact, one of the main arguments used to justify these enormous appropriations by the legislators who vote them and it would have force if the taxes were not already so high that they are paralyzing and the sale of tax exempt securities paying a comparatively low rate of interest did not so deplete the supply of capital that private enterprise is at a great disadvantage in the money market. But protest against them as we may we must take things as they are and in trying to understand the commercial and financial developments we should not ignore the shadows that coming events cast before them. The advance in cereals, especially wheat, the firmer markets for hogs and hog products and the improvement in sterling, which is now only 12 per cent below par, all probably represent the first response of sensitive markets to the impending expansion of American credit that will be called inflation when it ends and and contraction sets in. In time the upward movement is likely to extend itself to other commodities. In each case it will probably be attributed to special causes, just as the advance in wheat is related to the "drought talk" but underlying the whole series of bullish phenomena is a widening apprehension of the fact that the supply of money will shortly be augmented and that it will move with increasing velocity from hand to hand.

That this process has already commenced is perhaps indicated by the Federal Reserve Bank statement which shows a decline of one per cent in the reserve ratio, despite another increase of $7,000,000 in the gold held. It may, however, be premature to assume that the reserve ratio has passed its maximum, although there are many things that suggest that conclusion. None of the other markets as yet seem to share the buoyancy noticeable on the Chicago Board of Trade, but sugar, of which we consume ninety pounds per capita, costing at six cents a pound (about $600,000,000) has been very steady and a rapid distribution of the much talked of surplus seems in progress.

Commodity Market Firm

It is to be doubted whether the importance of sugar in our national food bill is generally understood. It is second only to wheat, for which we pay an average of probably $800,000,000 a year. As this comes to be appreciated a greatly increased interest is to be expected in sugar "futures," which are now actively traded in on the New York Coffee and Sugar Exchange.

Cotton has also been somewhat firmer during the week. The influences at work in the cotton market are so complex and often so invisible that they defy analysis, but here again it seems possible that the effect of possible inflation is being felt in advance. There is no immediate scarcity of cotton in prospect and there is a growing belief that an increased acreage will be planted this spring, but at or about sixteen cents the market shows great resistance, although the bears have had a threatened strike in New England and a panicky collapse in the price of East India cotton to help them.

In the cotton goods market business is dull. The heavy losses caused by the failure of Childs, Joseph & Co., who owe about $8,000,000, have had a dispiriting effect. A large portion of this sum is due on account of cotton goods sold for export and there is small hope of any substantial recovery. Wool is another article that is mysteriously firm. Statistically, supplies are ample, but at each successive auction sale there are buyers for every pound offered.

And so I might go through the whole list of commodities. Rubber and silk are the only important staples that have not shown an upward tendency and their weakness seems to be due mainly to conditions in the Orient rather than here. The steel industry is rather more active but there is still plenty of room for improvement. Copper is static but it is significant that Phelps, Dodge & Co. are to resume mining operations. After a year of great depression the shipping business seems to be picking up and freight rates are advancing.

Bond Sales Increasing

In the financial market Liberty Bonds have recovered some of last week's decline in the hope that a Bonus Bond issue may be averted, but the bond market generally is easier and appears to be satiated. Some of the recent issues, including the $30,000,000 sold by the Chicago, Burlington & Quincy Railroad, are below the issue price upon reselling by underwriters. Upon the whole stocks are firmer, but the activity has been sporadic and it cannot be explained by a generalization. The liquidation of marginal holdings was completed months ago and prices now respond readily to bullish manipulation when it is applied; but there is no spontaneous bullishness as yet.

The news from Europe has no special significance for American business men. Those who expected that the existence of the alchemists stone would be revealed at the Genoa Conference are somewhat disappointed that Uncle Sam is not likely to attend and there is talk of postponing the gathering.

It does not make much difference. The world is tired of inconsequent conferences. It is time for it to stay at home, work hard, economize and stop borrowing. When we learn to do this in America we will prosper, but it seems probable that we are going to have one more inflationary fling before we are willing to settle down and save money. Meanwhile "Watch your step" should be the motto of those who can keep their heads.

The Trend of Business Improvement—Plants Resuming

The General Electric Co., Windsor, Conn., is operating its local plant on a full-time schedule, and employees who have been with the company for a period of five years or longer have received a bonus of 5 per cent, based on their earnings for the last six months of 1921.

The Standard Castings Co., Lansing, Mich., has resumed production at its plant following a shut down of several weeks.

The Hedden Iron Construction Co., New York, is operating its structural steel and iron works at West Elizabeth, N. J., at full capacity with regular working force.

The Lackawanna Railroad is arranging for increased operations at its East Buffalo, N. Y., shops and about 250 men will be added to the force. The company has placed orders for new machine tools to cost about $185,000, a number of which will be installed at the local plant and the remainder placed in service at the Scranton, Pa., works.

The Ideal Furnace Co., Milan, Mich., has resumed operations at its plant after a shut down of several weeks.

The Rolls-Royce of America, Inc., is operating its automobile manufacturing plant at Springfield, Mass., under a 48-hour week schedule, and has added about seventy-five men to the working force within the past fortnight, bringing the total employees to about 300.

The National Maccore Co., Kalamazoo, Mich., is arranging for immediate increased production at its plant for the manufacture of automobile motors. Orders have been received from the Checker Taxicab Co., Chicago, Ill., for 1,800 motors, and from the Commonwealth Motors Co., Chicago, for 750 engines, the contracts totaling more than $1,500,000 in value.

The Erie Railroad Co. has resumed operations at its shops at Hornell, N. Y., following a shut down for a number of weeks. The working force will be increased gradually until a full quota of men is employed.

The Ninth Street Pipe Shops, Gadsden, Ala., have resumed production after an idle period of several weeks, and have booked orders insuring operations for some time ahead.

The Arvac Manufacturing Co., Anderson, Ind., manufacturer of disc universal joints for automotive service, is arranging plans for immediate increased production at its plant, and will place orders for additional machinery for plant expansion. Orders have been taken from the Velie Motors Co., Moline, Ill., for 1,000 disc joints for February delivery, and for about 6,000 joints for propeller shaft work. R. O. Bright is president.

The Phoenix Iron Works, Meadville, Pa., will increase operations at its local plant for the fabrication of about 5,000 tons of steel plate, to be used in connection with an order for seventeen oil storage tanks for the Sinclair Crude Oil Producing Co., to be located at Cushing, Okla. Each tank will be of 80,000 barrels capacity.

The American Furnace and Foundry Co., Milan, Mich., is operating at capacity, and plans for early increase in operations for the production of furnaces and furnace castings. Tentative plans are being considered for the erection of a new addition.

The Gray & Davis Co., Boston, Mass., manufacturer of starting and lighting systems for automobiles, is increasing production at its plant for equipments for the American Bosch Magneto Co. Manufacture in January exceeded 12,500 systems, as compared with 9,093 in December, and the production schedule calls for 15,000 in March.

The Standard Steel Car Co., Pittsburgh, Pa., has taken a contract for the construction of fifty-three steel mail and baggage cars for the Chicago, Burlington & Quincy Railroad, and will handle the work at its plant at Hammond, Ind.

The Martin-Parry Corporation, York, Pa., manufacturer of automobile bodies, is arranging a production schedule of 40,000 motor truck bodies during the present year, to be used by the Willys-Overland Co., Toledo, Ohio. The work will be divided between the company's shops at York, and at Indianapolis, Ind. The company has plans under consideration for the establishment of a branch plant at St. Louis, Mo., and for a new mill in Louisiana.

The Illinois Central Railroad Co., Chicago, Ill., has placed orders for 36,000 tons of steel rails, the contracts being divided between the Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., 20,000 tons; the Illinois Steel Co., Chicago, 11,000 tons; and the Inland Steel Co., Chicago, 5,000 tons.

The Transue & Williams Steel Forging Corporation, Alliance, Ohio, has resumed production at its local plant following a curtailment for a number of weeks.

The Buffalo Steel Car Co., Buffalo, N. Y., will give employment to about 300 men at its local plant for repair work on 850 hopper and box cars for the Lackawanna Railroad. Operations at the shops will be increased.

The Bryden Horseshoe Works, Catasauqua, Pa., operated by the Manufacturers' Iron & Steel Co., are maintaining continuous production and have plans in progress for early increase in capacity.

The Central Foundry Co., New York, N. Y., has resumed operations at its branch plant at Medina, N. Y., following a period of curtailment; the plant gives employment to about 100 men.

Acer & Wheadon Co., Medina, N. Y., manufacturer of sheet metal products, is operating at full capacity and plan to double the present plant output with employment of about fifty additional men. Plans are under way for the erection of an addition, 85 x 100 ft., to provide for the expansion.

The Westinghouse Electric and Manufacturing Co. has added 200 to the production force at its Springfield (Mass.) plant and is now employing 1,300. This increase is due principally to the rapid rise in demand for radio apparatus. All the company's orders for small radio sets are being manufactured there. A convention of sales managers from all branches east of Chicago was held at the plant Jan. 26 and 27, for the purpose of giving instruction in the mechanism and use of various Westinghouse products.

Rolls-Royce of America, Inc., Springfield, Mass., is making weekly additions to its factory force, and is now employing 300. The basic pay rate has been reduced from 57 to 42 cents an hour, with a continuance of the bonus system hitherto in force.

Chicago Letter

There is continued dullness in the local machine tool market. Inquiries as a whole are fairly plentiful but in most cases are for small and miscellaneous equipment. A few dealers report January business as very good. Nothing as yet has been done by the Rock Island Railroad on its large list, issued sometime ago. The Sante Fe has made additional purchases this week and at the present time is inquiring for three motor-driven tool-post grinders for internal and external grinding. The Illinois Central is still holding off with its shop equipment list but it is expected to be heard from soon.

Sometime ago the Streets Company issued a large list of machinery and equipment wanted. It later developed that they were contemplating to undertake the manufacture of steel cars and the list was only to give them a better idea of the project. The local dealers have hopes that this will really develop into business later. The American Car and Foundry Co. is contemplating a new plant for the manufacture of steel cars. A few weeks ago a group of Southern lumbermen, represented by James N. Litsey of this city, purchased thirty-eight acres of land near Fifty-second Ave. and West Pershing Road and announced through Mr. Litsey that they were contemplating the erection of a $250,000 plant to build and repair railroad freight cars.

The Checker Taxicab Co. placed an order last week for a few lathes and other equipment. The American Steel Foundries purchased a No. 1½ Cincinnati cutter and tool grinder. The G. A. Ball Bearing Manufacturing Co. has moved into its newly erected plant and is expected to be in the market for at least a few new machines. The Vienna Model Bakery Co. has not awarded the contract for the construction of its new plant but expects to within a few days. It will cost approximately $150,000 with equipment.

Notices of auction sales are numerous, very much to the discontent of the dealers. Auction sales have been going on for the past six or eight months at an average of about two a week. Last week there were four: The Central Tool and Supply Co., 39 South Desplaines St.; Hermes Manufacturing Co., 448 N. Well St.; Chas. Schultz Paper Box Manufacturing Co., 2373 Milwaukee Ave., and the Universal Service Co., 4527 West Lake St. The influence of these bankruptcies is largely offset by the number of new corporations.

Great crowds attended the Automobile Show and the general opinion among the exhibitors was that it was a great success. In addition to the automobiles and accessories there was a good display of machinery and machine tools.

—— *SMILE* ——

Automotive Stocks in Brazil

Imports of automobiles into Brazil have been insignificant for several months past, with few German, Belgian, and Italian cars arriving. Sales from the stocks of American cars have continued, due to price offers at fixed exchange rate of five or six milreis to the dollar. The demand for cheaper American cars has been good, especially for use as taxis, the Fiat being their most important competitor. There has been little business in higher-priced passenger cars.—*Commerce Reports.*

Business Items

The Northern Motor and Machine Co. has been incorporated at Tonasket, Wash. Capital stock $25,000. Incorporators are C. N. Merrill and M. E. Bowen.

The Standard Motor Co. has been incorporated in Springfield, Mo., to manufacture and repair motors and automobiles. J. G. Graves, P. R. Palmer and C. E. Woodruff are named as directors.

The Frank G. Payson Co., Chicago, Ill., general sales agents for "Logan" air operated devices, has been dissolved. The sales of Logan products will be handled from the Logansport, Ind., office of the Logansport Machine Co., with Frank G. Payson in charge.

The Wayne Machinery Co., Taylor St., and Lake Erie R.R., Fort Wayne, Ind., with branches in Louisville, Ky., and Dayton, Ohio, announces that it is not connected in any way with any concern of a similar name.

A controlling interest in the Bollman-Wilson Foundry Co., Cincinnati, Ohio, has been purchased by William Gilbert, president of the Cincinnati Steel Castings Co. The amount concerned is said to be $150,000.

Employees of the Springfield (Mass.) Armory have voted not to accept a pay reduction ranging from 10 to 25 per cent., recently announced by the commandant. Owing to objections by union machinists it was also voted not to form a welfare association among the employees.

The Connecticut Iron and Metal Co., 63 Knowlton St., Bridgeport, Conn., has recently filed papers of dissolution with the Secretary of State of Connecticut.

The Dayton-Dowd Co., Quincy, Ill., announces the opening of a district office in Pittsburgh at 809 Keenan Bldg., which will handle the sales of that company's centrifugal pumps and underwriters' fire pumps. The office will be in charge of T. J. Barry, who for the past several years has been connected with the home office on engineering and sales.

As the result of action taken in the Kosciusko, Ind., Circuit Court recently, W. S. Felkner has been named receiver for the Economy Tool Co., at Warsaw, Ind. He is instructed by order of the court to dispose of the assets and to pay the creditors. Mr. Anderson, head of the concern, was in court and asserted that the assets of the company are almost double the liabilities, indicating that the receiver will be able to pay all claims in full. The Economy Tool Co. moved to Warsaw from Chicago about a year ago.

The Bass Foundry and Machine Co., of Fort Wayne, Ind., has filed articles to increase its capital stock from $1,700,000 to $2,100,000. The amount of $400,000 will be raised by an issue of 6 per cent cumulative stock, which is to be used to replace bonds of the company, officials state.

Personals

W. H. SAWTELL is now tool equipment engineer for the Mehl Machine Tool and Die Co., Roselle, N. J.

HARRY A. HOPF, formerly organization counsel of the Federal Reserve Bank of New York, has established the H. A. Hopf Co., with offices in the Barrett Bldg., 40 Rector St., New York City. Mr. Hopf will practice management engineering and will be assisted by Mark W. Jones, formerly of the Edison industries; R. C. Foster, of DuPont de Nemours & Co.; and G. B. Buck. Walter S. MacArthur will be Western representative with offices in the Webster Bldg., Chicago, Ill.

ROBERT M. GATES has resigned as engineer for the Lakewood Engineering Co., Cleveland, Ohio.

H. D. JAMES, manager of the central engineering department of the Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa., has been elected president of the Engineers' Society of Western Pennsylvania. Frederick Crabtree was elected vice-president.

R. M. WILLIAMS has been elected president of the Thomas Cox Machinery Co., Little Rock, Ark. Mr. Williams takes the place of A. B. Cox, who resigned Jan. 1.

L. H. HOUGHTON has been appointed superintendent of the machine tool division of the Greenfield Tap and Die Corporation, Greenfield, Mass.

ANDREW H. GREEN, JR., vice-president of the Solvay Process Co., Syracuse, N. Y., has been elected president of the Charcoal Iron Co. of America. Mr. Green fills the chair recently vacated by Frank W. Blair, who resigned.

A. J. HAMBLEN has recently been transferred from the Pacific coast sales division of the Gilbert & Barker Manufacturing Co., to the general sales department at the home office in Springfield, Mass.

M. D. MORLEY has been appointed far eastern sales and engineering representative of the Combustion Engineering Corporation and is located at present in Manila, P. I.

SYDNEY E. PHILLIPS, Hartford, Conn., has recently been appointed temporary receiver of the Connecticut Blower Co., Inc., Sheldon St., Hartford.

L. C. FERGUSON, of the general sales department of the Gilbert & Barker Manufacturing Co., Springfield, Mass., has recently been assigned to the Chicago office of the company, to have charge of the sales promotion work in that territory.

HENRY C. STEVENSON, 305 Warner Bldg., Bridgeport, Conn., has been appointed receiver of the Garrison Company, Inc., manufacturing engineer, with a plant at Bridgeport, Conn.

S. C. HOPE, of the general sales department of the Gilbert & Barker Manufacturing Co., Springfield, Mass., has recently returned home after eighteen months' stay in Europe.

DONALD F. HODGDON has been transferred from the position of instructor in machine shop practice at the Motor Transport Training School at Camp Holabird, Baltimore, Md., to the position of assistant head of the machinist department of the War Veterans Bureau, Vocational School No. 1, Camp Sherman, Chillicothe, Ohio.

BURTON C. WARNER, secretary of the Baird Machine Co., Stratford, Conn., machinery manufacturers, was elected a vice-president and a director of the Stratford Trust Company, at the annual meeting held recently.

E. S. CUSHMAN, of the general sales department of the Gilbert & Barker Manufacturing Co., Springfield, Mass., has recently been placed in charge of the independent oil sales division of the company. K. A. Martenson, will be assistant to Mr. Cushman.

H. L. CARPENTER, JR., has been appointed traveling representative in Western Pennsylvania for the Ajax Metal Co., of Philadelphia, Pa. Mr. Carpenter was formerly in charge of the company's offices in Pittsburgh and in Philadelphia.

WILLIAM B. TODD, vice-president of the Union Drawn Steel Co., Beaver Falls, Pa., has been appointed sales manager of the cold-rolled department of the Jones & Laughlin Steel Co., of Pittsburgh, Pa.

CLIFFORD WATSON, vice-president and director of the Sheet Metal Manufacturing Co., Youngstown, Ohio, announces his resignation from those offices.

H. W. CROSS, formerly of the General Electric Company, is now manager of the New England office of the C. H. Wheeler Manufacturing Co., at Boston, Mass.

Obituary

HENRY A. CARPENTER, former president of the New England Foundrymen's Association, died suddenly on Jan. 29 at his home in Providence, R. I. He was fifty-three years old.

GEORGE W. ELMES, treasurer of the William T. Johnson Co., Cincinnati, Ohio, machinery dealers, died in Newport, Ky., on Jan. 24. He was sixty-five years old.

JOHN HENRY LEWIS, president of the Jones & Lewis Bolt Manufacturing Co., of New York died last week at his home. Mr. Lewis was also president of the William Gaskel Bolt Manufacturing Co., of Greenpoint, Long Island.

Road Builders Exhibit Latest Machinery

Over two million dollars' worth of machinery, materials and equipment was exhibited at the twelfth annual congress and show of the American Road Builders' Association. The exhibit occupied the large Chicago Coliseum and annexes for five days—Jan. 16 to 20 inclusive. There were 177 exhibitors.

The convention sessions brought out many technical papers which provided much discussion of the problems of road builders. Legislation received a great deal of attention, the congress endorsing the Woodruff Highway Bill, now pending in Congress, which appropriates $100,000,000 as Federal aid for road building.

Condensed-Clipping Index of Equipment

Patented Aug. 20, 1918

Clamp, Diemaker's

Art Tool Co., 16 Montgomery St., Bridgeport Conn.

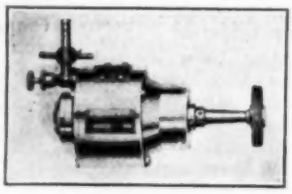
"American Machinist," September 8, 1921

This clamp is intended for holding a die and punch together when scribing or "off-setting." Adjustable toes accommodate punches of different heights, and joints in the crossbar permit the tool to adapt itself to varying widths. There are no screws or loose pins in the toes. They are free to be moved up or down when no work is in the clamp, and will hold firmly against the pressure of the screws when the pins fall into any of the notches upon the bars. The clamp is made of casehardened mild steel.

Grinder, Pneumatic, Turbine-type.

Onsrud Machine Works, Inc., 3908 Palmer St., Chicago, Ill.

"American Machinist," September 15, 1921

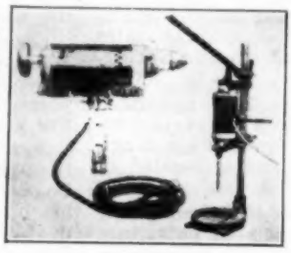


This device has a high-speed motor propelled by compressed air and intended especially for driving grinding wheels. It is said that the motor attains a speed as high as 30,000 r.p.m., the speed being controlled by means of a valve at the entrance of the air to the housing. Although the complete unit weighs only 5½ lb., it is said to be capable of producing ¼ hp. The unit can be held in the hand and operated the same as a portable grinder. It is especially intended for attachment to machine tools and holding fixtures for special purposes can be furnished. The grinder ordinarily requires 10 to 12 cu.ft. of free air per minute at a pressure of 70 to 100 lb. per square inch.

Drill, Portable, Electric.

Electro-Magnetic Tool Co., 2902 Carroll Ave., Chicago, Ill.

"American Machinist," September 15, 1921



The tool has a capacity of ¼ in. A stand, shown at the right, makes the tool serve as a small drill press. The motor is series wound, has a large commutator, and an aluminum ventilating fan. The gears are hardened and ground, and all are removable. The spindle shaft is equipped with ball thrust bearings and runs in bronze bearings. A switch gives control of the tool at the handle. All connections are made in the switch box, the cover of which is removable. The commutator may be inspected and the brushes removed simply by taking off a cover plate.

Block, Test, Toolmaker's.

Art Tool Co., 16 Montgomery St., Bridgeport, Conn.

"American Machinist," September 15, 1921

This squaring and testing block is for use in laying out and testing work upon the bench plate. It is hardened and ground square and true in all planes, and the V-groove is accurately located with respect to the sides. It is claimed to be free from error to 0.0001 inch. A yoke is furnished to hold round work in the "V," the yoke being held in slots that are milled in the same face as the "V," so that the block will rest squarely upon any one of the other five sides. Tapped holes are located in convenient places on each of the surfaces to facilitate clamping.

Toolbits, Standard.

New England Tool and Machine Co., Inc., 51 Taylor St., Springfield, Mass.

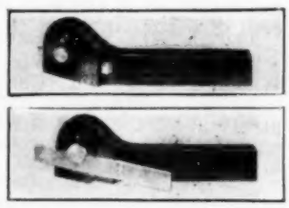
"American Machinist," September 8, 1921

The toolbits are said to be cut from annealed bars of highest quality high-speed steel. They are formed, hardened and ground to standard shapes, with standard clearances. Cutting edges are provided on both ends. The line includes diamond points, side tools, round-nose tools, U. S. Standard thread tools for all pitches, V-thread tools and cut-off tools. The sizes furnished are ⅛, ⅛, ⅜, ½, ⅝ and ¾ inch.

To[illegible]ers, Spring.

Willard Tool Co., Inc., 105 East Main St., Chicago, Ill.

"American Machinist," September 15, 1921

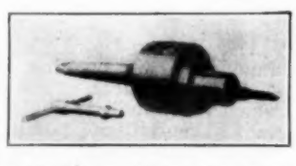


The holder is made of drop-forged steel, and is hardened to a spring temper. The "goose-neck" is formed by means of a saw-cut through the body of the shank. At the top of the illustration is shown the regular form of threading and forming toolholder having a right-hand offset. The toolbit is carried in a square broached hole, and a non-binding clamping device operated from the side is employed to hold it in place. At the bottom of the illustration is the cutting-off tool-holder of the right-hand offset type. The cutting-off tool is also made in a right-hand straight style. The device is made in sizes.

Boring Head, Adjustable.

Rickert-Shafer Co., Erie, Pa.

"American Machinist," September 15, 1921

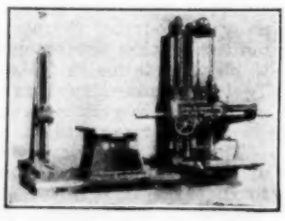


The device is provided with two hollow-head setscrews for holding the cutting tool in the shank, and can be furnished with the size and style of taper shank required. A micrometer dial is used to vary the eccentricity of the toolholding shank. The dial can be set to zero for any setting of the tool. A clamp both locks the toolholder in the required position and draws it against the body. The head is made in three sizes. The adjustment of the tool each side of center is ¾ in. for the No. 1 size, ⅞ in. for the No. 2, and 1¾ in. for the No. 3.

Boring, Drilling and Milling Machine, P. & H.

Pawling & Harnischfeger Co., 38th and National Aves., Milwaukee, Wis.

"American Machinist," September 22, 1921.



The machine is made in several sizes, the one illustrated being the No. 4-F, the smallest of the series. It is intended to drive high-speed tools to the limit of their capacity. The principal features to which the maker calls attention are the narrow guiding surfaces, the feed screws operating in tension, the provision for taking up wear on all sliding parts, and the centralized control. There are eight boring and drilling feeds for the spindle, operating in either direction, and eight milling feeds to the column and saddle. The rapid power traverse has a constant speed of 60 ft. per min.

Clip, paste on 3 x 5-in. cards and file as desired

Book Reviews

An Investigation of the Fatigue of Metals. By H. F. Moore and J. B. Kommers, research professors of engineering materials, University of Illinois. Bulletin No. 124 of Engineering Experiment Station, University of Illinois. Investigation conducted in co-operation with the National Research Council, the Engineering Foundation and the General Electric Co. Paper covers, 185 pages, 6 x 9 in., 46 illustrations and charts, 12 tables. Published by the University of Illinois, Urbana, Ill. Price 95 cents.

The volume tells of the conditions, the procedure and the results obtained in tests on the failure of ferrous metals under repeated stress. It contains much information in the form of micrographs and curves. It was observed that there was a well-defined critical stress at which the relation between unit stress and the number of reversals necessary to cause failure changed markedly. No simple relation between the endurance limit and the elastic limit was found, no matter in what manner the latter was determined. The ultimate tensile strength and Brinell hardness furnished better indices of the endurance limit. The "rise of temperature" method also may be used for this purpose. The volume gives the relative merits of other methods of determining the endurance limit, and explains the phenonema observed in each case. It gives recommendations for further experiments. The report is valuable because of the first-hand data that it contains, and because it contributes some real thought to the subject of the failure of metals under repeated stress.

Structure and Related Properties of Metals. Circular No. 113 of the Bureau of Standards; can be obtained from Superintendent of Documents, Government Printing Office, Washington, D. C. Price twenty-five cents.

This circular which replaces one of earlier date (No. 42, Metallographic Testing), is a comprehensive discussion of that phase of metallography indicated by the above title. The numerous examples which have been used throughout the test have been taken from the results of metallographic examination made by the bureau, of specimens submitted for examination, as well as those used for research. The various methods for revealing the micro-structure as well as the meaning of the features revealed are discussed, and a list of re-agents for revealing the microstructure included. By means of numerous "live" examples the conditions which affect the structure of metals are discussed, also the effect of structural features upon mechanical and chemical properties of metals. A rather comprehensive discussion of the applications of the microscopy of metals is given.

Friction and Carrying Capacity of Ball and Roller Bearings. Technologic Paper No. 201, Bureau of Standards; can be obtained from Superintendent of Documents, Government Printing Office, Washington, D. C., price ten cents.

The experiments about which this paper is written were undertaken by the Bureau of Standards, at the suggestion of the Navy Department, to determine the maximum safe load, and the static friction under load, of ball and flexible roller bearings. Tests were made on balls of 1.00, 1.25 and 1.50 in. diameter in grooved races and on rollers 1.25 in. in diameter and 5.25 in. long in flat and cylindrical races. The ratio of friction to load is practically constant and equal to 0.00055 for all three sizes of balls up to a "critical" load which varies with the diameter of ball. A similar "critical" load, 25,000 lb., was found for the roller bearings with a ratio of friction to load equal to 0.00075.

The paper was preperad by H. L. Whittemore and S. N. Petrenko, mechanical engineers of the bureau.

Kritik des Zeitstudienverfahrens. By I. M. Witte. Seventy 6 x 8½-in. pages. Published by Julius Springer, Berlin.

This is a short study of the progress and present status of time and motion study work in America and Germany. One chapter is devoted to the Taylor time studies, one to time study in America and one to time study in Germany. Of the other two one is introductory and the other describes modern motion study practice as developed by F. B. and L. M. Gilbreth.

A chronological bibliography is added as an appendix.

Export Opportunities

The Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, D. C., has inquiries for the agencies of machinery and machine tools. Any information desired regarding these opportunities can be secured from the above address by referring to the number following each item.

A commercial agency firm in Spain desires to purchase and secure an agency for the sale of all kinds of tools, machine tools, steel and iron tubes for steam, gas, and water. Quotations should be given c.i.f. Spanish port. Payment to be made on arrival of goods. Correspondence should be in French or Spanish. Reference No. 660.

A commission agent in Palestine desires to purchase and secure the representation of firms for the sale of general hardware, safes, galvanized-iron pipes, water pumps, motor-vehicle accessories. Quotations should be given c.i.f. Jaffa. Reference No. 664.

A firm engaged in the general commission business in Argentina desires to secure the representation on commission from manufacturers of iron and steel, construction materials, plain and barbed wire. Reference No. 677.

An agency is desired by a commission merchant in Spain for the sale of electrical supplies, railway supplies, such as rails, ties, plates, bolts, nuts, switches, and frogs; machinery; electric motors; small pumps, etc. Reference No. 704.

The purchase and agency are desired from manufacturers by a merchant in India for the sale of cycles, motorcycles and motor cars. Quotations should be given c.i.f. Madras. Payment to be made against documents. Reference No. 681.

A trading company in England desires to purchase engineering spares, lubricators in cast iron, malleable iron, blued steel, and brass; light feed and telltale lubricators; lubricating oils, fuel oils, Diesel oil, and gas oil. Quotations should be given c.i.f. English port. Terms: Cash against documents on inspection of goods. Reference No. 702.

A commercial agency firm in Sweden wishes to secure the representation of firms for the sale of automobiles. Quotations should be given c.i.f. Stockholm or Goteborg. Reference No. 687.

Catalogs, prices, and full information regarding sawmill machinery are requested by a business man in Nigeria, Africa. He is particularly interested in the purchase of a device for sawing trees into boards, scantlings, etc. Quotations, if possible, should be given c.i.f. Lagos, Africa, or f.a.s. New York. Reference No. 688.

Pamphlets Received

Arc Welding: Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa. A small leaflet, No. 1825, published by this company, covering the use of arc welding for repair and reclamation. It also tells how costs can be reduced by the use of arc welding.

Industrial Salvation: By Clinton E. Woods, industrial engineer, 1421 Chestnut St., Philadelphia, Pa. A constructive analysis of the present industrial situation with many pointed suggestions for remedies. Mr. Woods attributes the chaotic state of affairs in many businesses to a lack of proper accounting methods, which leaves the manufacturers in darkness as to his costs at a time when he needs this information most. Mr. Wood is a noted authority on industrial engineering questions.

Handbook for Drillers: Pamphlet distributed by the Cleveland Twist Drill Co., Cleveland, Ohio. It is intended for students in drilling problems, and is an introduction to the theory underlying the use of the twist drill.

Industrial Rehabilitation: Federal Board for Vocational Education, Washington, D. C. Bulletin No. 70 of Series 3, on services of advisement and co-operation in civilian rehabilitation of persons disabled in industry or otherwise. It deals specifically with some of the concrete problems of industrial rehabilitation. The material was gathered by F. G. Elton and J. A. Kratz, of the board, and Dr. Frank Harrison, of the U. S. Public Health Service.

Trade Catalogs

Hunter Saws and Tools. Hunter Saw and Machine Co., Pittsburgh, Pa. Catalog E illustrating and describing a comprehensive line of solid and inserted tooth metal cutting circular saw blades, inserted tooth setting device, serrating device, slate saws, pipe cutters, circular knives, rotary shear blades, saw sharpening machines, rivet sets, chisel blanks and a few specialties. The booklet is beautifully made up with illustrations and a substantial cover.

Inserted Tooth Cutters. Ingersoll Milling Machine Co., Rockford, Ill. A four-page circular devoted to a description of five types of Ingersoll cutters.

National Keyseating Millers. National Machine Tool Co., Cincinnati, Ohio. A twenty-page catalog illustrating and describing a line of keyseating millers for use in a drilling machine for milling internal key seats. The catalog covers twenty different diameters of millers.

Oilgear Control Pumps. The Oilgear Co., 60 Twenty-seventh St., Milwaukee, Wis. Bulletin No. 6, describing the latest model oil gear control pump manufactured by this company; illustrations showing the construction of individual parts are provided, as well as detailed specifications.

Wagner Polyphase Motor. Wagner Electric Manufacturing Co., St. Louis, Mo. Circular describing the new Wagner Pow-R-full motor.

Niagara Presses. Niagara Machine and Tool Works, Buffalo, N. Y. A voluminous catalog, No. 54, bound in imitation leather, containing about 300 pages of descriptions of the various squaring and rotary shears, rolls, punches, tinsmiths' tools and machines, power presses, etc. Complete and detailed information on each machine is given and the pages are well illustrated with pictures of the complete machines and individual parts.

Wagner White Light Converters. Wagner Electric Manufacturing Co., St. Louis, Mo. A series of small circulars describing the Wagner white light converter, Type S. C. The covers of each circular picture some famous movie star, a novel way of attracting attention to the material inside.

Universal Grinder. Arva Stroud, 327 Broadway, New York City. Circular describing in truly Gallic fashion, a line of grinders manufactured by Rene Volet, in France. Nine operations are illustrated.

Drill and Tap Grinders. Bickford-Switzer Co., Greenfield, Mass. Catalogs describing, with illustrations, some new principles of design in drill grinding machines. Specifications for each machine are furnished.

Sebastian Lathes. Sebastian Lathe Co., Cincinnati, Ohio. Catalog No. 26, describing by word and picture a comprehensive line of cone head, geared head and quick-change lathes.

Blackmer Pumps. Blackmer Rotary Pump Co., Petoskey, Mich. A circular briefly illustrating a few Blackmer pumping units.

"Gewe" Cutting Machine. General Welding and Equipment Co., 74 Brookline Ave., Boston, Mass. Catalog describing the "Gewe" automatic cutting machine, patents for which are now pending.

Franke Flexible Couplings. Smith & Serrell Co., Newark, N. J. Bulletin No. 32 describing a line of flexible couplings for direct-connected machines. The couplings are made by the Franke Co., New Brunswick, N. J.

Forthcoming Meetings

American Boiler Manufacturers' Association: Winter meeting, Feb. 13, Fort Pitt Hotel, Pittsburgh, Pa. H. N. Covell, secretary, 191 Dikeman St., Brooklyn, N. Y.

American Institute of Electrical Engineers: Mid-winter meeting Feb. 15, 16 and 17. Engineering Societies Building, New York City. F. L. Hutchinson, secretary.

American Institute of Mining and Metallurgical Engineers: Annual meeting Feb. 20 to 24, Engineering Societies Building, New York City. B. Staughton, secretary.

American Society for Steel Treating: Sectional meeting, New York City, Mar. 3, Hotel McAlpin, 34th St. & Broadway. W. H. Eiseman, secretary, 4600 Prospect Ave., Cleveland, Ohio.

The Weekly Price Guide

THIS WEEK'S MARKET

Although the Pittsburgh mill price of $1.50 on structural steel continues to prevail, it is applicable to increasingly smaller tonnages. Quotations as low as $1.40 per 100 lb. on soft steel bars and tank plates have been effected on sufficiently large orders. Mill shipments, New York, on bars, shapes and plates are quoted at $1.83@$1.88 per 100 lb.

Electrolytic copper in New York warehouses is quoted at 14¼c. as against 14⅜c.; tin at 32¼c. advanced from 32c. and zinc at 5¼c. as compared with last week's quotation of 5⅜c. per lb. Lead demand steady but prices remain unchanged. Zinc sheets (casks) in fair sized lots are quoted at 9.15c. as against 10.65c. per lb. in Cleveland warehouses.

Dealers' purchasing prices on old metals have dropped ¼c. per lb. on all classes of non-ferrous materials and discounts on leather belting have declined about 5 points in the New York market.

Linseed oil is quoted in New York at 79c. as against 77c. and in Chicago at 84c. as compared with 80c. per gal. one week ago.

IRON AND STEEL

PIG IRON—Per gross ton—Quotations compiled by The Matthew Addy Co.:

CINCINNATI	
No. 2 Southern	$22.50
Northern Basic	22.02
Southern Ohio No. 2	23.52
NEW YORK—Tidewater Delivery	
Southern No. 2 (Silicon 2.25 to 2.75)	28.50
BIRMINGHAM	
No. 2 Foundry	18.00
PHILADELPHIA	
Eastern Pa., No. 2x, 2.25-2.75 sil.	22.26
Virginia No. 2	28.74
Basic	20.75
Grey Forge	22.50
CHICAGO	
No. 2 Foundry local	21.70
No. 2 Foundry, Southern, sil 2.25@2.75	24.66
PITTSBURGH, including freight charge from Valley	
No. 2 Foundry	22.46
Basic	20.96
Bessemer	21.96

SHEETS—Quotations are in cents per pound in various cities from warehouse; also the base quotations from mill:

Blue Annealed	Pittsburgh, Large Mill Lots	New York	Cleveland	Chicago
No. 10	2.25	3.28	3.10	3.38
No. 12	2.30	3.33	3.15	3.43
No. 14	2.35	3.38	3.20	3.48
No. 16	2.55	3.48	3.30	3.58
Black				
Nos. 17 and 21	2.85	3.80	3.55	3.95
Nos. 22 and 24	2.90	3.85	3.60	4.00
Nos. 25 and 26	2.95	3.90	3.65	4.05
No. 28	3.00	4.00	3.75	4.15
Galvanized				
Nos. 10 and 11	3.00	4.00	3.75	4.15
Nos. 12 and 14	3.10	4.10	3.85	4.25
Nos. 17 and 21	3.40	4.40	4.15	4.55
Nos. 22 and 24	3.55	4.55	4.30	4.70
No. 26	3.70	4.70	4.55	4.85
No. 28	4.00	5.00	4.75	5.15

WROUGHT PIPE—The following discounts are to jobbers for carload lots on the latest Pittsburgh basing card:

Steel Inches	Steel Black	Steel Galv.	BUTT WELD Inches	Iron Black	Iron Galv.
1 to 3	71	58½	¾ to 1½	44½	29½
LAP WELD					
2	64	51½	2	39½	25½
2½ to 6	68	55½	2½ to 4	42½	29½
7 to 8	65	51½	4½ to 6	42½	29½
9 to 12	64	50½	7 to 12	40½	27½
BUTT WELD, EXTRA STRONG, PLAIN ENDS					
1 to 1½	69	57½	¾ to 1½	44½	30½
2 to 3	70	58½			
LAP WELD, EXTRA STRONG, PLAIN ENDS					
2	62	50½	2	40½	27½
2½ to 4	66	54½	2½ to 4	43½	31½
4½ to 6	65	53½	4½ to 6	42½	30½
7 to 8	61	47½	7 to 8	35½	23½
9 to 12	55	41½	9 to 12	30½	18½

Malleable fittings. Classes B and C, Banded, from New York stock sell at net list. Cast iron, standard sizes, 20–5% off.

WROUGHT PIPE—Warehouse discounts as follows:

	New York Black	New York Galv.	Cleveland Black	Cleveland Galv.	Chicago Black	Chicago Galv.
1 to 3 in. steel butt welded	66%	53%	60½%	47½%	62½%	48½%
2½ to 6 in. steel lap welded	61%	47%	58½%	44½%	59½%	45½%

Malleable fittings. Classes B and C, Banded, from New York stock sell at list less 10%. Cast iron, standard sizes, 32–5% off.

MISCELLANEOUS—Warehouse prices in cents per pound in 100-lb. lots:

	New York	Cleveland	Chicago
Open hearth spring steel (base)	4.50	6.00	4.50
Spring steel (light) (base)	6.00	6.00	6.00
Coppered Bessemer rods (base)	7.00	8.00	6.03
Hoop steel	3.38	2.96	3.13
Cold rolled strip steel	6.25	8.25	6.50
Floor plates	4.60	4.56	3.40
Cold finished shafting or screw	3.45	3.25	3.40
Cold finished flats, squares	3.95	3.75	3.90
Structural shapes (base)	2.63	2.46	2.63
Soft steel bars (base)	2.53	2.36	2.53
Soft steel bar shapes (base)	2.53	2.36	2.53
Soft steel bands (base)	3.13	....	3.13
Tank plates (base)	2.63	2.46	2.63
Bar iron (2.00@2.10 at mill)	2.68	3.52	2.78
Drill rod (from list)	55@60%	55%	50%
Electric welding wire:			
⅜	8.50		12@13
¼	7.15		11@12
5/32 to ⅛	6.75		10@11

METALS

Current Prices in Cents Per Pound

	New York	Cleveland	Chicago
Copper, electrolytic (up to carlots), New York			14.25
Tin, 5-ton lots, New York			32.50
Lead (up to carlots), St. Louis, 4.60; New York			5.00
Zinc (up to carlots), St. Louis, 4.90; New York			5.25
Aluminum, 98 to 99% ingots, 1-15 ton lots	19.20	20.00	18.00
Antimony (Chinese), ton spot	5.50	6.50	6.75
Copper sheets, base	21.25	22.00	23.00
Copper wire (carlots)	15@15.25	17.00	16.25
Copper rods (ton lots)	19.75	24.00	19.50
Copper tubing (100-lb. lots)	21.25	24.00	23.00
Brass sheets (100-lb. lots)	16.75	17.00	18.75
Brass tubing (100-lb. lots)	18.50	19.50	20.50
Brass rods (1,000-lb. lots)	14.75	16.00	15.75
Zinc sheets (casks), (8% dis. carlots)	10.50	9.15	15.75
Nickel (ingot and shot), Bayonne, N. J.	41.00	.....	.....
Nickel (electrolytic), Bayonne, N. J.	44.00	.....	.....
Solder (½ and ½), (case lots)	19.00	23.50	19.25
Babbitt metal (best grade)	31.00	41.00	36.00
Babbitt metal (commercial)	16.00	13.50	9.00

—Shop Materials and Supplies

SPECIAL NICKEL AND ALLOYS—Price in cents per lb.

Malleable nickel ingots	45
Malleable nickel sheet bars	47
Hot rolled rods, Grades "A" and "C" (base)	60
Cold drawn rods, Grades "A" and "C" (base)	72
Copper nickel ingots	37
Hot rolled copper nickel rods (base)	45
Manganese nickel hot rolled (base) rods "D"—low manganese	64
Manganese nickel hot rolled (base) rods "D"—high manganese	67

Base price of monel metal in cents per lb., f.o.b. Bayonne, N.J.:

Shot	35.00	Hot rolled machined rods (base)	53.00
Blocks	35.00	Hot rolled rods (base)	42.00
Ingots	38.00	Cold drawn rods (base)	56.00
Sheet bars	40.00	Hot rolled sheets (base)	55.00

OLD METALS—Dealers' purchasing prices in cents per pound:

	New York	Cleveland	Chicago
Copper, heavy, and crucible	11.00	11.00	11.00
Copper, heavy, and wire	10.75	10.50	10.00
Copper, light, and bottoms	8.75	9.00	8.75
Lead, heavy	3.75	3.50	3.50
Lead, tea	2.75	2.75	3.00
Brass, heavy	5.75	6.00	6.50
Brass, light	4.25	4.25	5.00
No. 1 yellow brass turnings	5.50	5.00	5.75
Zinc	2.75	2.00	2.75

TIN PLATES—American Charcoal Plates—Bright—Cents per lb

		New York	Cleveland	Chicago
"AAA" Charcoal Melyn Grade:				
IC,	20x28, 112 sheets	20.00	18.25	18.50
IX,	20x28, 112 sheets	22.50	21.00	20.90
"A" Charcoal Allaways Grade:				
IC,	20x28, 112 sheets	17.00	16.00	17.00
IX,	20x28, 112 sheets	20.00	18.75	19.60
Coke Plates, Bright				
Prime, 20x28 in.:				
100-lb.,	112 sheets	12.50	12.00	14.50
IC,	112 sheets	12.80	12.30	14.80
Terne Plate				
Small lots, 8-lb. Coating:				
100-lb.,	14x20	7.00	5.60	7.25
IC,	14x20	7.25	5.85	7.40

MISCELLANEOUS

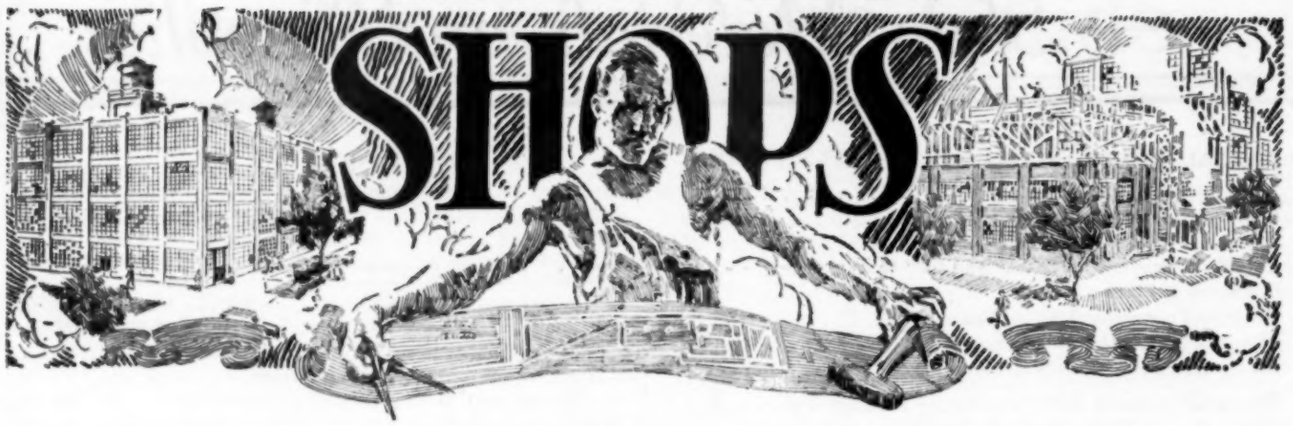
	New York	Cleveland	Chicago
Cotton waste, white, per lb	$0.07½@$0.10	$0.12	$0.13
Cotton waste, mixed, per lb	055@.09	.09	.11
Wiping cloths per M., 13¼x13¼	.....	50.00	55.00
Wiping cloths per M., 13¼x20½	.....	55.00	65.00
Sal soda, 100 lbs	2.10	2.50	2.65
Roll sulphur, 2-bbl. lots per 100 lb	2.55	3.25	3.50
Linseed oil, per gal., 5 bbl. lots	.79	.80	.84
White lead, dry or in oil	100 lb. kegs.	New York, 12.25	
Red lead, dry	100 lb. kegs.	New York, 12.25	
Red lead, in oil	100 lb. kegs.	New York, 13.75	
Fire clay, per 75 lb. bag		.80	1.00
Coke, prompt furnace, Connellsville	per net ton	$2.75@$3.00	
Coke, prompt foundry, Connellsville	per net ton	3.75@ 4.25	

SHOP SUPPLIES

Current Discounts from Standard Lists

	New York	Cleveland	Chicago
Machine Bolts:			
All sizes up to 1x30 in	60-5%	60-10%	60-10-10%
1⅛ and 1¼x3 in. up to 12 in	50%	60-10-10%	60-10%
With cold punched sq. nuts	50%	.....	....
With hot pressed hex. nuts up to 1x30 in. (plus std. extra of 10%)	55%	.....	..$4.00 off
Button head bolts, with hex. nuts	35%	$3.90 net	.....
Hex. head and hex. nut bolts	40%	.....	65-5%
Lag screws, coach screws	65%	.....	60%
Carriage bolts, up to 1 in. x 30 in.	50-10%	60-10%	50-5%
Bolt ends, with hot pressed nuts	60%	.....	55%
Tap bolts, hex. heads	25%	.....	.....
Semi-finished nuts ⅝ and larger	75%	75-10%	80%
Case-hardened nuts	65%	.....	.....
Washers, cast iron, ½ in., per 100 lb. (net)	$4.50	$3.50	$3.50
Washers, cast iron, ⅜ in. per 100 lb. (net)	3.75	3.50	3.50
Washers, round plate, per 100 lb. Off list	4.00	....	3.50 net
Nuts, hot pressed, sq., per 100 lb. Off list	3.00	3.50	4.00
Nuts, hot pressed, hex., per 100 lb. Off list	3.00	3.50	4.00
Nuts, cold punched, sq., per 100 lb. Off list	3.00	3.50	4.00
Nuts, cold punched, hex., per 100 lb. Off list	3.00	3.50	4.00
Rivets:			
Rivets, 7/16 in. dia. and smaller	60-5%	60-10-10%	65-5%
Rivets, tinned	60-5%	60-10-10%	4½c. net
Button heads ¾-in., ⅞-in., 1x2 in. to 5 in., per 100 lb (net)	$3.50	$3.25	$3.43
Cone heads, ditto (net)	3.60	3.35	3.53
1¼ to 1⅞-in. long, all diameters, *EXTRA* per 100 lb	0.25	.....	0.15
⅝ in. diameter *EXTRA*	0.15	.....	0.15
½ in. diameter *EXTRA*	0.50	.....	0.50
1 in. long, and shorter *EXTRA*	0.50	.....	0.50
Longer than 5 in *EXTRA*	0.25	.....	0.25
Less than 200 lb *EXTRA*	0.50	.....	0.50
Countersunk heads *EXTRA*	0.35	.....	$4.03 base
Copper rivets	60-5%	50%	50-10%
Copper burs	40%	50%	.....
Lard cutting oil (50 gal. bbl.) per gal.	$0.90	$0.85	$0.90
Machine oil, lubricating, (50 gal. bbl.) per gal.	0.45	0.35	0.40
Belting—Present discounts from list in fair quantities (½ doz. rolls)			
Leather:			
Light grade	50%	50-5%	60-10%
Medium grade	40-5%	40-10-2½%	50%
Heavy grade	35%	40%	40-5%
Rubber and duck:			
First grade	50-10%	50-10%	.....
Second grade	60-10%	60-5%	60-5%
Abrasive materials—In sheets 9x11 in.:			
No. 1 grade, per ream of 480 sheets, Flint paper	$5.84	$3.85	$6.48
Emery paper	8.80	11.00	8.80
Emery cloth	27.84	32.75	29.48
Flint cloth, regular weight, width 3½ in., No. 1 grade, per 50 yd. roll	4.50	.....	4.95
Emery discs, 6 in. dia., No. 1 grade, per 100.			
Paper	1.32	...	1.49
Cloth	3.02	.....	3.20

NEW *and* ENLARGED



Machine Tools and Machinery Wanted

Machine-tool wants published without charge

Ala., Gadsden—The Etowah Fdry. & Machine Co.—one hand operated 3 ton overhead traveling crane.

Ala., Fairhope—The Farmers Co-operative Ice & Creamery Co., E. C. Rockwell, Secy.-Treas.—deep well pumps, 90 to 100 ft.

Ark., Little Rock—The Arkansas Platinum Development Co., P. O. Box 815, C. C. Williams, Secy. — complete reduction machinery.

Conn., Stratford—C. W. Beeman, Lordship Manor—one arbor press for garage use.

Conn., Waterbury — Connecticut Gears, Inc., 545 Cooke St., T. Clark, Pres. and Treas.—one 3 in. J. & L. flat turret lathe.

Ga., Rome—C. H. Nichols, 216 West 5th Ave.—one 10 to 20 ton raw water, motor driven ice machine complete.

Ill., Chicago—The Chicago Roller Skate Co., 4458 West Lake St.—one No. 2 Baird burnishing barrel, single or double.

Ill., Chicago—Hoeft & Co., 400 North Ashland Ave—one No. 4 straight sided press or double column for short stroke.

Ill., Chicago—The U. S. Ball Bearing Mfg. Co., 4535 Palmer St., J. C. Ness, Purch. Agt.—Vanadium sheet steel of the following analysis: carbon—.2 to .3; Manganese—.5 to .8; Vanadium—.15; Phosphorus—.045 (maximum); Sulphur—.050 (maximum); sizes preferably 19 to 21 gauge, 12 in. wide and 10 ft. long.

Ill., Chicago—W. E. Williams, 28 East Jackson Blvd.—one speed lathe.

Ill., Kankakee — The Kankakee Rug Cleaners, 1145 South Osborne Ave.—laundry machinery.

Ill., Peoria—B. Ley, 200 Culter St.—three horning presses similar to No. 12 and No. 14 Toledo.

Ill., Rockford—The Old Colony Chair Co., Seminary St.—woodworking machinery including sander.

Ill., Kankakee — Mang & Zeisler, South Schyler Ave.—lathe and drill press for proposed garage.

Ia., Clinton—F. Smith & Son, 600 Railroad St., manufacturer of boxes—woodworking and nailing machines.

Ia., Davenport—A. J. Lerch Co., 120 West 3rd St., sheet metal working machinery.

Ky., Leitchfield—The Leitchfield Laundry, L. Vienez, Mgr.—one 75 to 100 lb. capacity steam washer, extractor and 3 roll ironer and other laundry equipment (new or used).

Ky., Lexington — The Kentucky Fruit Laxative Co., Inc., 172 Georgetown St.—fruit grinders (on order of meat chopping machines); wrapping machines capable of wrapping sticky ground fruit; machinery for mixing sticky and tough masses.

La., New Orleans—The Model Sheet Metal Wks., 624 Julia St., V. Palazzolo, owner—equipment for repair shop.

La., New Orleans—The Standard Equipment Co., 622 Tchoupitoulas St.—one 10 ft. power brake, ¾ in. plates.

La., New Orleans—The Valley Ice Co., C. A. Vitter, 1125 Julia St., Purch. Agt.—modern machinery for proposed ice plant on Rocheblave and Republic Sts.

La., New Orleans—The O. H. Van Horn Co., 518 Camp St.—one No. 55 or No. 60 Heald grinder (used).

Mass., Quincy—The city—equipment for manual training department of proposed high school on Coddington St.

Mass., Worcester—The Wickwire Spencer Steel Corp., 69 Hammond St.—straightening and cutting machine, Shuster or another similar make.

Md., Baltimore—The Amer. Concrete Tie & Products Co., Inc., 201-5 Gaither Bldg., or 111 North Charles St., J. W. Ritter, Secy.—complete line of machinery for plant manufacturing concrete products.

Md., Baltimore — Slaysman & Co., 801 East Pratt St., machinery manufacturers—horizontal boring, milling and drilling machine, Lucas type preferred (used).

Mich., Detroit—The Grand Sheet Metal Wks, 2113 Grand River Ave.—sheet metal working equipment.

Mich., Detroit—The Harwick Stamping Corp., Miller Rd. and Thayer St.—miscellaneous stamping equipment.

Mich., Detroit—F. Horawa, 4234 Mt. Elliott Ave.—one lathe, 12 in. to 14 in. swing, (used).

Mich., Detroit—C. L. Schwartz, 602 Hammond Bldg.—one drill press and lathe, (used).

Minn., Cloquet—The Northwestern Paper Co., C. I. McNair, Mgr.—machinery for sulphite paper mill.

Minn., Minneapolis—The Mirviss Mfg. Co., 116 Washington Ave., N.—Special machinery for proposed overall factory at Amery, Wis.

Minn., St. Paul—The Heaters, Inc., 1927 Dayton Ave., D. B. Howard, Purch. Agt.—One 24 in. to 30 in. throat punch, capacity ⅝ in. in ¾ in. One 4 ft. to 6 ft. squaring shear for eight gage stock. One bevel shear. One power roll for 6 gage, 7 ft. long. One angle roll. One rotary shear, throatless preferred. Six 1-ton triplex hoists. (New or used.)

Mo., Joplin—The Economy Tire Co., 833 Main St., F. C. Allen, Mgr.—equipment and machinery including 3 cavity tire moulds, air bags, buffer, automobile tire tools and electric motors, 5 hp.

Mo., Joplin — The Empire Electric Machine Co., 4th and Joplin Sts., R. Cumblin, Mgr.—coil spreader, taping machine, coil winder, and impregnator tanks.

Mo., Joplin—C. Flowers, 1605 East 7th St.—hand drill press; hand emery wheel, 8 in.; and work bench lathe.

Mo., Joplin—C. Weaver, 107 East 7th St.—one 3 hp. motor, lathe, drill press and emery wheel.

Mo., Kansas City—The Berkowitz Envelope Co., Traders Bldg. — One linotype machine, No. 9.

Mo., Pierce City—A. Kuklenski & Sons—garage tools including vises, drill presses and automobile repair tools.

Mo., Pierce City—The School Bd.—manual training equipment including saws, planers, electric rip saw, boring machine, hammers and lathe.

Mo., Springfield—The Shea & Morris Monument Co., 1112 Boonville Ave.—electric traveling crane for heavy stone work.

Mo., St. Louis—E. B. Lamgenberg, 4057 Forest Park Blvd.—machinery for use in manufacture of galvanized and tin furnace pipe and fittings.

Mo., Webb City—The Jefferson Highway Garage, Daugherty St., J. V. Lear, Mgr.—electric drill press, lathe and emery wheel.

Mo., Weston—J. R. Schumacher—Machinery for refrigerator plant.

N. Y., Buffalo—R. E. Dougan Co., 66 Oak St.—one 14 x 22 Colts-Armory press.

N. Y., New York—I. P. Fink, Inc., 24th St. and 10th Ave.—one 10 ft. power brake to work sheet metal up to 16 gage.

N. Y., Troy—The Alpha Brush Co., J. W. Brandshaw, Purch. Agt.—rotary blower similar to P. H. & F. M. Roots machine, size 4 or smaller.

N. C., LaGrange—S. T. Mears—machinery for cotton mill.

N. C., Spindale—The Horn Co., C. Horn, Pres.—machinery for braiding rag rugs.

N. C., Wilmington—The Carters Production Wks., 210 South Water St., O. Carter, Mgr.—Yates, Berlin or other good standard 8 x 14 or 20, four side planer for planing mill, (used).

O., Akron—Brown-Graves Co., 65 East Miller Ave., manufacturer sash, doors and interior finish—one veneer jointer (used).

O., Cleveland—The Bd. Educ., c/o F. G. Hogen, Dir. of Schools, Rockwell and East 6th Sts.—equipment for manual training at West Technical High School, including one band sawing machine, one 18 in. hand planer and jointer, one 30 in. single surface planer, one double arbor Universal saw, Universal revolving oil stone tool grinder, 2 wood turners and one combinaton band saw setting and filing.

O., Cleveland—The city, J. F. Maline, Dir. of Pub. Service, City Hall—one steam driven locomotive crane for the garbage reduction plant at Willow.

O., Cleveland—The Hoff Mfg. Co., 5209 Prospect Ave.—No. 2½ Universal milling machine.

O., Columbus—The Ramey Mfg. Co., 31 South Wall St., E. J. Ramey, Pres. and Genl. Mgr.—electric welder and cutting machine, 6 ft. wide.

O., Toledo—The Toledo Metal Furniture Co., Dorr St.—one No. 63 Toledo punch press and one No. 52 Bliss press.

Okla., Hammon—C. T. Lee—concrete block machine.

Okla., Tulsa—The Public Service Co., of Oklahoma, 107 East 4th St., c/o J. McCrary, Treas.—boilers, engine, and machinery, and equipment for proposed ice plant at Atoka.

Ore., Molalla—H. Russell—machinery for drying prunes.

Pa., Greensburg—Kelly & Jones Co., (iron pipe fittings, brass and iron valves). C. H. Sparrell, Purch. Agt.—one press similar to Bliss No. 5.

Pa., Lester—The Lester Piano Co., G. Miller, 1306 Chestnut St., Phila., Treas.—additional woodworking machinery.

Pa., Norristown—The Herald Co., 73 East Main St., R. S. Jones, Owner—additional printing plant equipment.

Pa., Phila.—Moore & White Co., 15th St. and Lehigh Ave., (machinists)—additional machinery and tools for new factory.

Pa., Phila.—The Penna. Sugar Refinery Co., 1037 North Delaware Ave., G. H. Earl, Mgr.—additional sugar refining machinery.

Pa., Phila.—The Reyburn Mfg. Co., 32nd St. and Allegheny Ave.—one model C or small Becker vertical milling machine, (used).

Pa., Phila.—E. Sutro & Sons, Thompson and Clearfield Sts., P. E. Sutro, Purch. Agt.—machinery for new hosiery factory.

S. C., Greenville—The Chamber of Commerce, Textile Hall, O. W. McCarrell, Secy.—Bids will be received until Feb. 15, machinery for creamery.

Tenn., Old Hickory—(R. D. from Shelbyville)—The Southland Motor & Body Corp., Inc., P. A. Wells, Secy.-Treas.—large sheet steel rollers, shears and breakers.

Tex., San Antonio—C. R. Tips, 605 Natl. Bank of Commerce Bldg. (glass manufacturer)—bottle blowing machinery, air compressor, pumps, gasoline and oil engines, fire bricks, structural steel, and oil tanks.

Va., Chatham—J. Whitehead—machinery for the manufacture of brooms, particularly wire winders and straw cutters.

Va., Danville—The Register Publishing Co., 115 South Union St., R. A. James, Jr., Owner—modern printing press and equipment for newspaper printing plant.

Va., Norfolk—The Hampton Roads Equipment Co., Inc., 251-252 Arcade Bldg., W. L. Duncan, Genl. Mgr.—revolvator, 2,000 lb. capacity, operated by hand winch; motor equipped, equipment to lift approximately 16 ft.

Va., Red Oak—D. F. Dunlop—medium size planer and matcher, 4 sides, not less than 6 x 18 in., for wood-working plant, (used).

Va., Richmond—The Richmond Mill Supply Co., Inc., P. O. Box 208, Manchester Station, T. A. Henderson, Purch. Agt.—Boom swinging electric hoist, A.C., 3 phase, 60 cycle, 220 volt motor, direct connected, to handle stiff leg derrick of 12,000 lb. capacity; also prices on hoist without motor. One each, 150, 100 and 175 hp. both slip ring squirrel cage, A.C., 3 phase, 60 cycle, 220 volt, motors.

W. Va., Wheeling—The Wheeling Steel Corp., Wheeling Steel Corp. Bldg.—ten or twelve cranes including two 150 ton ladle cranes for Steubenville and Portsmouth plants.

Wis., Evansville—The Solid Set Broom Co., c/o R. M. Richmond—modern broom making machinery.

Wis., Madison—Dane County, c/o M. Sommers, 512 West Wilson St.—complete refrigeration machinery.

Wis., Madison—The Kennedy Dairy Co., 618 University Ave.—ash hoist and conveyor also refrigerating machinery and special dairy equipment.

Wis., Merrill—The Merrill Buick Co.—lathe, grinder, drill press and motor.

Wis., Milwaukee—E. Froelich, 222 12th St.—drill press suitable for garage duty.

Wis., Milwaukee—H. Grimes, 1165 35th St.—planer, band saw and jointer.

Wis., Milwaukee—The Huebsch Mfg. Co., 366 Brady St., J. Huebsch, Purch. Agt.—one 4 ft. radial drill.

Wis., Milwaukee—P. Kammers, 1301 7th St.—one drill press.

Wis., Milwaukee—The Routbord Mfg. Co., 86 3rd St., manufacturers of tools and dies, Z. Routbord, Purch. Agt.—drill press, medium size, and bench press.

Wis., Milwaukee—The Wisconsin Dye Wks., 614 Mitchell St.—gasoline storage tank and pump.

Wis., Mineral Point—W. Kislingburg—electrically driven floor surfacing machine.

Wis., Neillsville—P. M. Warlum—sheet metal working machinery.

Wis., Sheboygan—The S. W. Miller Piano Co., 2020 North 15th St.—special machinery and woodworking machinery for proposed piano factory on Niagara St.

Wis., Stevens Point—The Pfiffner Co., 229 Franklin St., E. J. Pfiffner, Purch. Agt.—woodworking machinery, sticker, etc.

Wis., South Milwaukee—The Bucyrus Co.—crane, also equipment for the manufacture of iron castings.

Wis., West Allis—The Kroening Constr. Co., 68th and Greenfield Aves. (garage and millwork)—drill press, emery wheel and chain hoist.

Wis., Whitelaw—The Cream Valley Co-operation Co., c/o J. Ebert, Route 1—separators and churns, (belt driven).

Wis., Wisconsin Rapids—The Grand Rapids Canning Co., H. Dorn, Mgr.—canning and crating machinery.

Ont., Belle River—The Dover Oil Co.—equipment, tanks, piping and drilling equipment.

Ont., Cottam—J. J. Vance—complete saw mill equipment. Estimated cost, $25,000.

Ont., Kitchener—The Greb Shoe Co.—$25,000 worth of special shoe making machinery and equipment.

Ont., London—The London & Port Stanley Ry., Philips St.—derrick, clam shell buckets and unloading and operating equipment for coal unloading depot at Port Stanley. Estimated cost, $25,000.

Ont., London—T. Terry, 150 Fullarton St.—equipment for garage and auto repair shop. Estimated cost, $40,000.

Ont., Windsor—Leggatt & Platt Bed Co., 928 McDougall St.—enameling plant and special equipment for the manufacture of beds. Estimated cost, $28,000.

Metal Working Shops

Cal., San Mateo—The Mineral Metal & Byproducts Co., First Natl. Bank Bldg., San Francisco, is having preliminary plans prepared for the construction of factory buildings here.

Ill., Chicago—M. Tauber & Sons Corp., 2231 Wabansia Ave., is having plans prepared for the construction of a 1 story, 67 x 190 ft. ice plant and a 1 story, 85 x 109 ft. garage at 2231 North Wabansia Ave. Estimated cost, $75,000.

Ill., Cicero—The Cicero-Chicago Corrugated Co., 1542 South 51st St., has awarded the contract for the construction of a 1 story, 130 x 130 ft. factory to replace the one destroyed by fire. Estimated cost, $75,000.

Ill., Kankakee—Mang & Zeisler, South Schyler Ave., plans to build a 1 story garage. Estimated cost, $50,000. Architect not selected.

Ill., Peoria—The Peoria Auto Parts Co., 817 South Adams St., is having plans prepared for the construction of a 2 story, 60 x 100 ft. garage, repair shop, etc. Estimated cost, $120,000. B. L. Hulsebus, Jefferson Bldg., Archt.

Ind., Crown Point—J. N. Coleman, Archt., 6257 St. Lawrence Ave., Chicago, will soon receive bids for the construction of a hospital including a 2 story, 50 x 80 ft. service building, for the Crown Point Hospital. Total estimated cost, $800,000.

Ind., Evansville—The Bucyrus Steam Shovel Co., Decker Rd., is having plans prepared for the construction of a 1 story, 120 x 240 ft. factory. Estimated cost, $40,000. Private plans.

Kan., Hutchinson—The city, c/o R. B. Lee, Engr., City Hall, is having plans prepared for the construction of a 1 story garage. Estimated cost, $50,000.

Ky., Louisville—Joseph & Joseph, Archts., 800 Francis Bldg., will soon receive bids for the construction of a 2 story, 60 x 200 ft. garage on 3rd and York Sts., for the Haury Motor Co., 811 South 3rd St. Estimated cost between $60,000 and $100,000.

Md., Baltimore—The Maryland Steel Rolling Co., 203 Fidelity Bldg., plans to build a factory on 6th and Monument Sts. Estimated cost, $85,000. Private plans.

Mich., Detroit—T. J. Doyle, 4462 Woodward Ave., has awarded the contract for the construction of a 1 story, 60 x 451 garage and service station on Jefferson Ave. Noted Jan. 12.

Mo., St. Louis—W. F. Parks, Frisco Bldg., will build a 3 story, 98 x 180 ft. garage on North Euclid Ave. Estimated cost, $50,000.

Mo., St. Louis—S. Simon, c/o Williams & Bland, 2717 Chestnut St., has awarded the contract for the construction of a 1 story, 189 x 331 ft. service and parcelpost station. Estimated cost, $150,000. Noted Jan. 26.

Mont., Bozeman—The University of Montana, State Bd. of Examiners, Helena, has awarded the contract for the construction of a 1 story, 119 x 182 ft. engineering shop, here. Noted Jan. 19.

N. J., Camden—The S. V. Reeves Stove Co., 22nd and Haynes Sts., will build a 2 story, 40 x 40 ft. stove foundry. Estimated cost, $15,000.

N. J., Camden—H. Read, 1103 Haddon Ave., has awarded the contract for the construction of a 1 story, 67 x 100 ft. garage at 1105 Haddon Ave. Estimated cost, $40,000.

N. Y., New York—The Cutting Larson Co., 109 West 64th St., has awarded the contract for the construction of a 6 story, 100 x 120 ft. automobile service building on 66th St. between 11th and 12th Aves. Estimated cost, $250,000.

O., Cleveland—R. S. Mueller Electric Co., 2143 Fairmount Rd., has awarded the contract for the construction of a 2 story, 63 x 94 ft. factory and garage on East 31st St. near Payne Ave. Estimated cost, $50,000. Noted Jan. 26.

O., Cleveland—The Stone Improvement Co., Rockefeller Bldg., has awarded the contract for the construction of a 1 story, 100 x 150 ft. office and garage on East 83rd St. and Carnegie Ave. Estimated cost, $50,000. Noted Dec. 8.

O., Lakewood (Cleveland P. O.)—H. B. Townsend, c/o W. J. Mooney, Archt., 17430 Woodford Ave., has awarded the contract for the construction of a 2 story, 60 x 100 ft. garage on Detroit Ave. near Fry St. Estimated cost, $40,000.

Pa., Phila.—The Bureau of Water, City Hall, is having plans prepared for the construction of a 1 story, 100 x 160 ft. garage and machine shop on 28th and Cambria Sts. Estimated cost, $60,000. Private plans.

Pa., Phila.—J. M. White Co., 1116 Olive St., has awarded the contract for the construction of a 2 story, 16 x 17 ft. and 54 x 60 ft. factory at 1122-28 Olive St., for the manufacture of wire braiding. Estimated cost, $25,000. Private plans.

Pa., Sharon—The Wilton Tool Mfg. Co., c/o U. Wilton, 2123 Grand River Ave., Detroit, Mich., has awarded the contract for the construction of two factories, 1 story, 20 x 100 ft. and 1 story, 50 x 200 ft., here. Estimated cost, $50,000. Noted Jan. 26.

Wis., Milwaukee—The Wisconsin Dye Wks., 614 Mitchell St., is having plans prepared for the construction of a 1 story, 60 x 120 ft. garage on 8th Ave. Estimated cost, $40,000. H. W. Voelz, 86 Michigan St., Archt. and Engr.

Wis., South Milwaukee—The Bucyrus Co. is receiving bids for the construction of a 1 story, 60 x 278 ft. iron foundry. F. D. Chase, Inc., 645 North Michigan Ave., Chicago, Engrs.

General Manufacturing

Cal., Newman—The Natl. Ice Cream Co., 371 Guerrero St., San Francisco, is having plans prepared for the construction of a 1 story ice cream plant here. Estimated cost, $40,000. J. T. Ludlow, 420 Montgomery St., San Francisco, Archt.

Cal., Riverbank—The Atchinson, Topeka & Santa Fe Ry., 605 Market St., San Francisco, has awarded the contract for the construction of an 84 x 134 ft. ice plant, here.

Conn., Waterbury—C. J. Bailey, Archt., 63 Bank St., is receiving bids for the construction of a 2 story, 60 x 120 ft. cracker plant on West Liberty St., for the Natl. Biscuit Co., 22 Spring St.

Ill., Chicago—The Franklin Mfg. Co., Chester and Clybourn Aves., manufacturer of asbestos material, has awarded the contract for the construction of a 3 story, 25 x 40 ft. addition to its factory. Estimated cost, $15,000.

Ill., Chicago—The Vienna Model Bakery Co., 1040 Vernon Park Ave., is receiving bids for the construction of a 3 story, 120 x 140 ft. bakery at 1226 West Congress St. Estimated cost, $150,000. McCormick Co., Century Bldg., Pittsburgh, Pa., Archts.

Ill., East St. Louis—The Obear Nestor Glass Co., Bway and Belt St., has awarded the contract for the construction of a 1 story, addition to its glass factory. Estimated cost, $75,000. Noted Jan. 12.

Ill., Kankakee—The Kankakee Rug Cleaners, 1145 South Osborne Ave., are having plans prepared for a 2 story, 50 x 125 ft. laundry and cleaning building. Estimated cost, $150,000. Private plans.

Ill., Park Ridge—The Northwestern Ice Co., will receive bids until Feb. 15 for the construction of a 1 story, 50 x 130 ft. ice cream plant. Estimated cost, $40,000. W. C. Robinson, Pres. Architect's name withheld.

Ind., Bloomington—Showers Bros. Furniture Co. plans to build a furniture factory. Estimated cost, $500,000. H. K. Ferguson Co., 6523 Euclid Ave., Cleveland, O., Archts.

Ind., Muncie—The Ball Bros. Glass Mfg. Co., 9th St. near Macedonia St., will build a 2 story, 90 x 300 ft. storage and manufacturing plant. Estimated cost, $150,000.

La., New Orleans—The Valley Ice Co. plans to build an ice plant (100 ton capacity) on Rochebl Ave. and Republic Sts. Estimated cost, $30,000. C. A. Vitter, 1125 Julia St., Purch. Agt.

Mass., Holyoke—W. Skinner Co. has awarded the contract for the construction of a 4 story, 70 x 200 ft. silk cloth mill on Bond St. Estimated cost, $100,000.

Mass., Mittineague—The Strathmore Paper Co. has awarded the contract for the construction of a 1 story addition to its paper factory. Estimated cost, $20,000.

Mass., Waltham—B. O. and G. C. Wilson, 196 Cambridge St., Boston, are having plans prepared for the construction of a 4 story, 60 x 200 ft. drug factory on River St., here. Estimated cost, $150,000. H. M. Hope Eng. Co., 186 Devonshire St., Boston, Engrs.

Md., Baltimore—The Amer. Ice Co., Calvert Bldg., is having preliminary plans prepared for the construction of an ice storage plant on Cough and Regester Sts. Estimated cost, $50,000. W. S. Engliss, care of owner. Engr.

Minn., Cloquet—The Northwestern Paper Co. is having plans prepared for the construction of a 3 story sulphite pulp mill. Estimated cost, $500,000. C. I. McNair, Mgr. G. F. Hardy, 309 Bway., New York, Archt. and Engr.

Minn., Newport—The Farmers Terminal Packing Co., 920 Commerce Bldg., St. Paul, is having plans prepared for the construction of a 1 story, 100 x 100 ft. ice plant. Estimated cost, $60,000. H. Edmunds, Secy. Newstrom-Lindquist Co., 810 Lumber Exchange, Minneapolis, Archts.

Mo., St. Joseph—The Bd. of Managers of State Institutions, Jefferson City, is having plans prepared for the construction of a 2 story kitchen, bakery and storage building, at State Hospital No. 2, here. Estimated cost, $150,000. Siemens & Arnhold, Bartlett Bldg., Archts.

Mo., St. Louis—E. Lantz Archt., 603 Post Dispatch Bldg., is receiving bids for the construction of a 5 story, 63 x 90 ft. factory and warehouse at 1130 South 6th St., for J. Weisert Tobacco Co., 1120 South 6th St. Estimated cost, $70,000. Noted Feb. 2.

Mo., St. Louis—The Natl. Chair Co., Main and Clark Sts., plans to build a 2 story chair factory on East Grand and Bulwer Sts. Estimated cost, $60,000. J. J. Yawitz, Pres. Architect not selected.

Mo., St. Louis—J. Wiesert Tobacco Co., 1120 South 6th St., is having plans prepared for the construction of a 5 story, 63 x 90 ft. factory and warehouse on 6th St. Estimated cost, $70,000. J. Wiesert, Pres. E. Lantz, Post Dispatch Bldg., Archt.

N. Y., Brooklyn—The Amer. Tobacco Co., 54 Park Ave., has awarded the contract for the construction of a 7 story, 50 x 90 ft. factory on Sanford St.

N. Y., New York—The Knickerbocker Ice Co., 45 East 42nd St., has awarded the contract for the construction of a 7 story, 70 x 90 ft. ice plant on Elizabeth St.

O., Cleveland—H. C. Benjamin, 3085 Lincoln Blvd., has awarded the contract for the construction of a 2 story, 50 x 60 ft. laundry at 1443 East 120th St. Estimated cost, $40,000.

O., Columbus—H. C. Goodman Co., 31 North 4th St., is having plans prepared for the construction of a 3 story, 160 x 240 ft. and 64 x 260 ft. shoe factory on West Broad St. Richards, McCarty & Bulford, 584 East Broad St., Archts. Noted Jan. 12.

O., Dayton—The Terminal Ice & Cold Storage Co. will receive bids until Feb. 6 for the construction of an 8 story, 135 x 150 ft. refrigerating and cold storage plant on Baker and Ludlow Sts. Estimated cost, $500,000. G. B. Bright Co., 103 Marquette Bldg., Detroit, Archts. Noted Jan. 6.

Okla., Atoka—The Public Service Co. of Oklahoma, 107 East 4th St., Tulsa, c/o J. McCrary, Treas., plans to build a 48 x 84 ft. ice plant, here. Estimated cost, $15,000. Private plans.

Pa., Altoona—The Confederated Home Abattoir Co., 123 Willow Ave., has purchased a site on Eldorado Rd. and plans to build a 3 story, 100 x 130 ft. meat packing plant. Estimated cost, $150,000. F. Rider, Secy.

Pa., Annville—The Greeb Shoe Co., 531 Market St., Phila., has had plans prepared for the construction of a 4 story, 51 x 178 ft. shoe factory, here. Estimated cost, $125,000. H. T. Hauer, 3110 West Columbia Ave., Phila., Archt.

Pa., Johnstown—The Leopold Bakery, Haynes St., will open bids about April 1 for the construction of a 3 story, 50 x 120 ft. bakery. Estimated cost, $150,000. G. L. Leopold, Mgr.

Pa., Norristown—The Norristown Journal has awarded the contract for the construction of a 3 story, 30 x 60 ft. printing plant on Main St. Estimated cost, $25,000.

In
1921
We published 2277 Machine-tool and Machinery-wanted items, and 3037 items on new and enlarged Metal-working Shops and General Manufacturing Plants
Are you making the most of the opportunities offered in these columns

Pa., Phila.—The Boice Folding Box Co., 4020 Spruce St., has awarded the contract for the construction of a 2 story, 50 x 56 ft. folding box factory on Ogden and Hatton Sts.

Pa., Phila.—Collins & Aikman have awarded the contract for the construction of a 6 story, 62 x 120 ft. plush factory on Viola and 51st Sts. Estimated cost, $110,000.

Pa., Phila.—The Curtis Publishing Co., c/o C. H. K. Curtis, Pres., Independent Sq., is having plans prepared for the construction of a 3 story, 130 x 150 ft. printing plant on 7th and Sansom Sts. About $200,000. F. C. Roberts & Co., Real Estate Trust Bldg., Engrs.

Pa., Phila.—The Ferris Shoe Co., Monnouth and Janney Sts., Frankford, is having plans prepared for the construction of a 3 story, 260 x 293 ft. shoe factory on 6th St. and Duncannon Ave., here. Simon & Simon, 239 South Juniper St., Archts.

Pa., Phila.—The Penna. Sugar Refinery Co., 1037 North Delaware Ave., has awarded the contract for the construction of a 2 story, 70 x 137 x 175 ft. sugar factory on Delaware Ave. and Laurel St. Estimated cost, $50,000.

Pa., Phila.—S. & M. Dye Wks., Inc. Schillier and Richmond Sts., has awarded the contract for the construction of a 2 story, 49 x 162 ft. wool factory. Estimated cost, $30,000.

Pa., Phila.—The Tasty Baking Co., 2335 Sedgley Ave., has awarded the contract for the construction of a 5 story, 100 x 100 ft. bakery on Hunting Park and MacMichael Sts.

R. I., Woonsocket — Jules Desurmont Worsted Co., Fairmount St., will soon award the contract for the construction of a 2 story addition to its yarn mill. Estimated cost, $75,000. Private plans.

Va., Petersburg—The Cockade City Mills, Inc., is having plans prepared for the construction of a flour mill, to consist of a 6 story, 36 x 72 ft. main building, a 2 story, 36 x 60 ft. storage annex, and a 36 x 36 x 80 ft. head house for cleaning and storage, etc., on South St. Estimated cost, $100,000. W. I. Wheary, Secy. and Treas. Architects name withheld.

W. Va., Morgantown.—R. A. Wilbourn Co. has awarded the contract for the construction of a 3 story, 36 x 100 ft. addition to its ice cream plant. Estimated cost, $55,000. Noted Jan. 19.

Wis., Amery—The Mirviss Mfg. Co., 116 Washington Ave., N., Minneapolis, Minn., plans to build a 2 story, 50 x 100 ft. factory here, for the manufacture of overalls. Estimated cost, $60,000. Architect not selected.

Wyo., Cheyenne—The Wyoming Packing Co. has been incorporated to take over the Hammond Packing plant at 1709 Capitol Ave., here, and plans to build a new plant in the near future.

Wis., Madison—J. Feldman Paper Box Co., 515 Regent St., plans to build a 2 story, 60 x 120 ft. box factory. Estimated cost, $50,000. Architect not selected.

Wis., Madison—The Kennedy Dairy Co., 618 University Ave., is having plans prepared for the construction of a 2 story, 85 x 132 ft. dairy on Washington St. Estimated cost, $100,000. E. Tough, 24 East Mifflin St., Archt.

Wis., Marinette—The Hagemeister Products Co., Manitowoc Bldg., Green Bay, has purchased a site on Marinette Ave., here, and plans to build a 2 story, 120 x 125 ft. ice cream factory. Estimated cost, $100,000. G. Schober, Secy. Architect not selected.

Wis., Milwaukee—The American Granite Wks., 15th and Cleveland Aves., plans to build a 1 story, 60 x 350 ft. granite works on 15th Ave., to replace the one destroyed by fire. Architect not selected.

Wis., Prairie-du-Chien—The Prairie-du-Chien Woolen Mill Co. is having plans prepared for the construction of a 2 story, 47 x 187 ft. woolen mill. Estimated cost, $200,000. F. H. Poehler, Pres. Parkinson & Dockendorff, Linker Bldg., LaCrosse, Archts.

Wis., Sheboygan—The S. W. Miller Piano Co., 2020 North 15th St., has purchased a site on Niagara St., and plans to build a 2 story, 56 x 108 ft. piano factory. Estimated cost, $65,000. Architect not selected.

Ont., Peterboro—Red Arrow Tires, Ltd., 309 George St., has awarded the contract for the construction of a 2 story tire factory. Estimated cost, $35,000.